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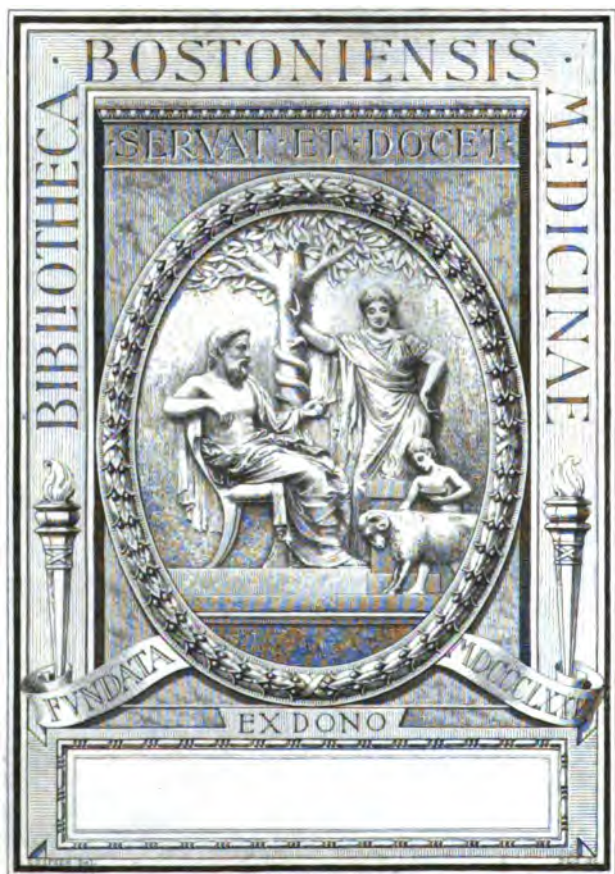
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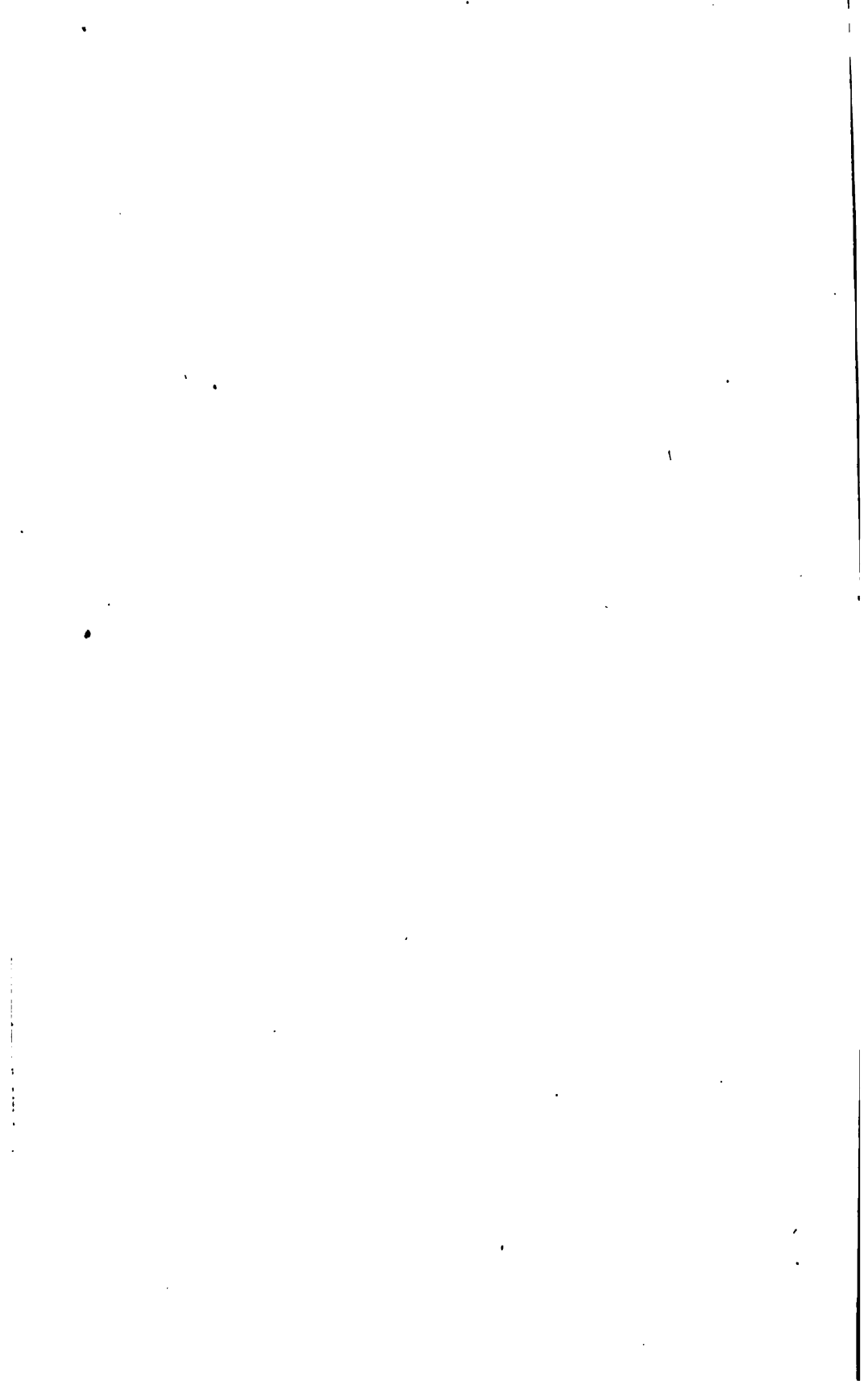
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CONTRIBUTORS TO VOLUME II.

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CLARK, JOHN G., M.D.

COLEY, WILLIAM B., M.D.

FOOTE, EDWARD MILTON, M.D.

JACKSON, EDWARD, M.D.

STENGEL, ALFRED, M.D.

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PROGRESSIVE MEDICINE.

A QUARTERLY DIGEST OF ADVANCES, DISCOVERIES,
AND IMPROVEMENTS

IN THE

MEDICAL AND SURGICAL SCIENCES.

EDITED BY

HOBART AMORY HARE, M.D.,

PROFESSOR OF THERAPEUTICS AND MATERIA MEDICA IN THE JEFFERSON MEDICAL COLLEGE OF PHILADELPHIA; PHYSICIAN TO THE JEFFERSON MEDICAL COLLEGE HOSPITAL; ONE TIME CLINICAL PROFESSOR OF DISEASES OF CHILDREN IN THE UNIVERSITY OF PENNSYLVANIA; MEMBER OF THE ASSOCIATION OF AMERICAN PHYSICIANS, ETC.

ASSISTED BY

H. R. M. LANDIS, M.D.,

VISITING PHYSICIAN TO THE TUBERCULOSIS DEPARTMENT OF THE PHILADELPHIA HOSPITAL, TO THE WHITE HAVEN SANATORIUM AND TO THE PHIPPS INSTITUTE; DEMONSTRATOR OF CLINICAL MEDICINE IN THE JEFFERSON MEDICAL COLLEGE.

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HERNIA—SURGERY OF THE ABDOMEN, EXCLUSIVE OF HERNIA—GYNECOLOGY
—DISEASES OF THE BLOOD. DIATHETIC AND METABOLIC DISEASES.
DISEASES OF THE SPLEEN, THYROID GLAND, AND
LYMPHATIC SYSTEM—OPHTHALMOLOGY.



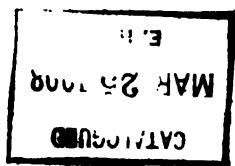
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LIST OF CONTRIBUTORS.

WILLIAM T. BELFIELD, M.D.,

Associate Professor of Surgery in the Rush Medical College; Professor of Genito-urinary and Venereal Diseases in the Chicago Polyclinic, Chicago.

JOSEPH C. BLOODGOOD, M.D.,

Associate in Surgery, Johns Hopkins University, Baltimore, Md.

JOHN ROSE BRADFORD, M.D., F.R.C.P., F.R.S.,

Professor of Medicine and Physician to the University College Hospital, London.

JOHN G. CLARK, M.D.,

Professor of Gynecology in the University of Pennsylvania, Philadelphia.

WILLIAM B. COLEY, M.D.,

Attending Surgeon to the General Memorial Hospital; Associate Surgeon to the Hospital for Ruptured and Crippled; Clinical Lecturer in Surgery and Instructor in Surgery at the College of Physicians and Surgeons, Columbia University, New York.

FLOYD M. CRANDALL, M.D.,

Adjunct Professor of Pediatrics, New York Polyclinic Hospital; Visiting Physician to the Minturn Hospital for Scarlet Fever and Diphtheria; Consulting Physician to the Infants' and Children's Hospitals, New York.

EDWARD P. DAVIS, M.D.,

Professor of Obstetrics in the Jefferson Medical College of Philadelphia.

WILLIAM EWART, M.D., F.R.C.P.,

Physician to and Joint Lecturer on Medicine at St. George's Hospital, and Physician to the Belgrave Hospital for Children, London.

EDWARD MILTON FOOTE, M.D.,

Instructor in Surgery, Columbia University; Visiting Surgeon to the New York City Hospital and to St. Joseph's Hospital, New York City.

CHARLES H. FRAZIER, M.D.,

Professor of Clinical Surgery in the University of Pennsylvania; Surgeon to the University, Howard, and Philadelphia Hospitals.

WILLIAM S. GOTTHEIL, M.D.,

Professor of Dermatology and Syphilology, New York School of Clinical Medicine; Consulting Dermatologist to the Sheltering Guardian Orphan Asylum; Dermatologist to the Lebanon and Beth Israel Hospital, and to the German West Side Dispensary, New York.

EDWARD JACKSON, M.D.,

Professor of Ophthalmology in the University of Colorado; Ophthalmologist to the City and County Hospital of Denver.

D. BRADEN KYLE, M.D.,

Professor of Laryngology in the Jefferson Medical College, Philadelphia.

H. R. M. LANDIS, M.D.,

Visiting Physician to the Tuberculosis Department of the Philadelphia Hospital, to the White Haven Sanatorium and to the Phipps Institute; Demonstrator of Clinical Medicine in the Jefferson Medical College.

ROBERT B. PREBLE, A.B., M.D.,

Professor of Medicine in Northwestern University Medical School; Attending Physician to Cook County, St. Luke's, Wesley, German, and Polyclinic Hospitals, etc., Chicago.

B ALEXANDER RANDALL, M.D.,

Professor of Otology in the University of Pennsylvania, Philadelphia.

WILLIAM G. SPILLER, M.D.,

Professor of Neuropathology and Associate Professor of Neurology in the University of Pennsylvania; Clinical Professor of Nervous Diseases in the Woman's Medical College of Pennsylvania and in the Philadelphia Polyclinic.

J. DUTTON STEELE, M.D.,

Associate in Medicine, University of Pennsylvania, Philadelphia.

ALFRED STENGEL, M.D.,

Professor of Clinical Medicine in the University of Pennsylvania, Philadelphia.

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PROGRESSIVE MEDICINE.

JUNE, 1907.

HERNIA.

By WILLIAM B. COLEY, M.D.

The Radical Cure of Femoral Hernia. Ochsner¹ in a paper upon "Femoral Herniotomy" read before the last annual meeting of the American Medical Association states that, while there has been an almost universal acceptance of the different principles embodied in the method of operation for inguinal hernia introduced by Bassini and modified by others, in femoral hernia the methods still differ greatly. Ochsner attempts to introduce into the treatment of femoral hernia a principle which, he states, has for many years been universally recognized in surgery, but which has apparently been employed by only a few surgeons in the treatment of femoral hernia. This principle rests upon the fact "that it is practically impossible to keep a circular opening in any part of the body from closing spontaneously unless it be lined with a mucous or serous membrane." The anatomical relations at the femoral canal, he believes, ordinarily form a definite circular opening, and, hence, should come under the application of the principle just enunciated.

Reviewing the literature of femoral hernia, Ochsner states that Socin, in 1897, referred to 6 cases which were apparently permanently cured by simply removing the hernial sac and fat and suturing the skin.

Ochsner's method in brief consists in removing the serous membrane of the sac which forms a lining to the femoral opening; removing all the fat which usually surrounds the sac; ligating the sac high up, so as to permit the stump to withdraw into the peritoneal cavity, then simply closing the skin. He believes that this method is applicable to all simple femoral hernias in which an actual femoral ring exists. It is naturally not adapted to operations for strangulated hernia in which no actual femoral ring exists. It is naturally not adapted to operations for strangulated hernia in which the femoral ring has been cut through to permit reduction.

¹ Journal of the American Medical Association, September 8, 1906, p. 751.

As to results, Ochsner states that he has operated upon 56 cases at the Augustana Hospital and has been able to obtain definite reports from 30, 26 of which were operated upon from two to fourteen years ago. In no case has there been a recurrence.

Ochsner believes that a study of the literature shows that the various methods of closing the opening by distorting the femoral canal are often followed by relapse, sometimes to the extent of 18 to 20 per cent. He concludes by giving a brief description of six other methods of operation for femoral hernia which have been or are being more extensively employed.

Personally I believe that Ochsner's objection to the more complicated operations for femoral hernia are well taken, and if it can be shown that equally good results may be obtained by the simpler methods there is very little ground for advocating the more complicated, particularly such operations as the Lotheisen-Gordon or Nicoll operations, already described in *PROGRESSIVE MEDICINE*. Ochsner's method, as far as he goes, is precisely the same as the one which has been employed by myself the last sixteen years. One cannot emphasize too much the importance of high ligation of the sac, careful removal of all the fat which surrounds the sac and fills the region of the femoral canal.

Personally, however, I believe it wiser to go a step farther than Ochsner and close the femoral opening by the purse-string suture, which I have several times described. It requires less than a minute to introduce the suture and brings the floor of the canal or pectineal fascia and muscle into contact with the roof and, I believe, furnishes additional security against recurrence, particularly in hernias of larger size.

My own views upon the subject of the radical cure of femoral hernia have been recently expressed in a paper read before the American Surgical Association, May 31, 1906.¹ This paper is based upon a report of 117 personal operations for femoral hernia in 105 patients. In 34 of these the patients were children between two to fourteen years of age; 83 operations were done upon adults or patients between fourteen to seventy years of age; 12 of these patients were male and 65 female.

The relative frequency of femoral to inguinal hernia, as given by Macready, is 1 to 16. Our cases at the Hospital for Ruptured and Crippled showed about the same percentage, namely, 1 to 17. The same ratio is found in my own operative statistics. In a total of 1805 operations for hernia 130 were for femoral hernia.

Previous statistics have almost always shown a slightly higher mortality of operation for femoral than inguinal hernia and a smaller percentage of cures.

As against entirely accepting Ochsner's opinion, that simple closure of the sac high up is sufficient for radical cure, may be cited the results

¹ *Annals of Surgery*, October, 1906.

of earlier operators for femoral hernia, which, in the main, employed methods very similar to that advocated by Ochsner. Pott, who collected 933 cases of femoral hernia operated upon prior to 1903, shows the percentage of permanent cures in femoral hernia distinctly smaller than in inguinal, being 70.5 per cent. in femoral to 82 per cent. in inguinal hernia. He further shows that the results were much better when the femoral canal was closed than when the sac was simply excised and the wound closed without suture of the canal, the percentage being 63 without suture and 76 with suture.

The various methods employed at the present time for the radical cure of femoral hernia may be divided into two main groups:

1. Those in which an effort is made to close the canal by means of a suture applied in a great variety of ways.

2. Those in which an attempt is made to close the canal by means of muscle, osteoplastic or heteroplastic flaps.

The reasons advanced by the authors in favor of adopting the more difficult and complicated procedures for the cure of femoral hernia are all based on the supposition that femoral hernia is not curable by simpler methods.

With this opinion, in company with Ochsner, I strongly desire to take issue. Bassini was the first to point out that practically perfect results could be obtained with the simpler methods. He reported 54 cases operated upon by his own method, of which 41 were traced from one to nine years, without a single relapse.

De Garmo, in a paper reviewed in the last number of *PROGRESSIVE MEDICINE*, reported 110 cases of femoral hernia operated upon by a method very similar to that of Bassini, with but one relapse.

In my own cases two methods have been employed, namely, Bassini's method, in 15 cases, with one slight relapse; this was the only case in which there was suppuration. The relapse consisted, however, only in a slight bulging of the canal, which disappeared after the use of a truss for a short time, and the patient is now well, ten years after operation. It can, therefore, hardly be classed as a true recurrence.

The great majority of my cases, 130 in number up to the present time, were operated upon by the so-called purse-string method, which, briefly described, is as follows:

An oblique incision is made one-quarter to one-half inch below Poupart's ligament and parallel with it, almost identical with the incision made for inguinal hernia, only slightly lower and a little shorter. The sac with the mass of extraperitoneal fat that almost always surrounds it is then freed well up into the femoral opening. The masses of fat are carefully removed; the sac itself, by gentle traction, is brought down well beyond its neck to a point where it widens into the general peritoneal cavity. It is always opened before ligature, to make sure that it is empty. If omentum is present, this is tied off and removed. The

ligature having been placed well beyond the neck by transfixion, it is carefully tied and the sac removed. When the stump of the sac has been pushed through the opening into the abdominal cavity, there is no longer any funicular process present in the femoral region. With a curved Hagedorn needle, threaded with kangaroo tendon of medium size, the suture is placed as follows: The needle is first passed through the inner portion of Poupart's ligament or the roof of the canal, then downward, taking firm hold of the pectineal fascia and muscle, then outward through the fascia lata overlying the femoral vein, and finally upward, emerging through the roof of the canal about one-quarter inch distant

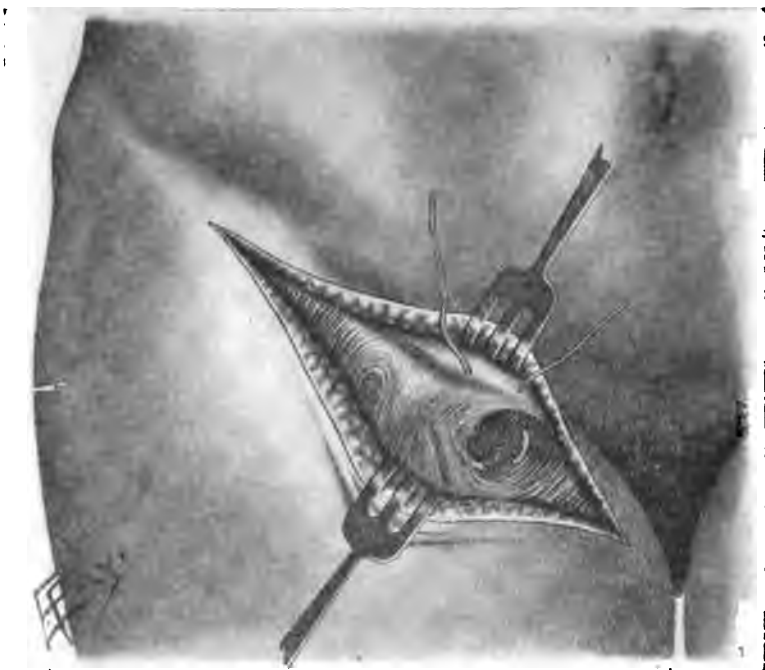


FIG. 1.—Obliteration of the femoral opening by purse-string suture. (Coley.)

from the point of entrance (Fig. 1). On tying this suture, the floor of the canal is brought into apposition with the roof and the femoral opening is completely obliterated. The skin and superficial fascia are closed by means of an interrupted catgut suture and a sterile dressing is applied, without drainage. The first change of dressing is made at the end of one week. The patient is kept in bed for two weeks and allowed to go home at the end of two and a half weeks. A firm spica bandage is worn one week after leaving the hospital, at the end of which time no further support is needed.

The purse-string suture thus applied accomplishes exactly the same

thing as Bassini's operation for femoral hernia, and it has the advantage that it is much more easily and quickly performed.

In the 115 cases operated upon by this method, most of which have been very carefully traced, there has not been a single relapse.

The final results of the present series of cases as far as traced are as follows: Well over ten years, 5; well from five to ten years, 17; well from two to five years, 35; well from one to two years, 12; or 57 well upward of two years; 69 upward of one year.

As regards the ages of the cases operated upon, my statistics up to May, 1906, show the following: Under five years, 3; five to ten, 15; ten to twenty, 19; twenty to thirty, 32; thirty to forty, 29; forty to fifty, 11; fifty to sixty, 5; seventy years of age, 1.

These cases have in no way been selected and the method has been employed in the largest hernias with equally good results. There have been no complications, with the exception of a slight phlebitis in 1 case which soon disappeared.

Mortality. In the non-strangulated cases there has been no mortality, and only 1 case of suppuration. In the strangulated cases, 4 in number, there was 1 death, in a woman, fifty-five years of age, in whom strangulation had existed for three days and the patient was in a desperate condition, necessitating resection of a large portion of the intestine. In another case of strangulation, a man seventy years of age, operation was performed in a tenement house in a small town. The patient apparently made a good recovery, but died two to three weeks later of some unknown cause. The physician in charge did not believe that death was in any way connected with the operation, although I do not think it fair to exclude the operation as a possible cause.

In spite of these practically perfect results from the simpler methods there is a tendency on the part of critics to condemn them on theoretical grounds. The objection is made:

1. That the abdominal orifice of the femoral canal is not closed.
2. That "the breach in the belly wall is attacked at the wrong end of the femoral canal;" furthermore, that "the crural arch itself is closed at a mechanical disadvantage."

Kammerer states that Bassini's method practically only closes the external femoral ring, and adds: "The same can be said, I think, of the various methods of purse-string suture which, if anything, only create greater tension."

He believes that the methods of Fabricius, Lotheissen, and Gordon are much superior. The results I have just given furnish, I believe, a satisfactory answer to the theoretical objections.

The point I would make, in discussing these various criticisms of the Bassini and purse-string methods, is that the value of an operation in surgery cannot be settled thus easily, and least of all can it be estimated according to the degree to which it fulfils certain theoretical, geometrical,

or mechanical conditions. There are a great many other factors that enter into the question. Let us take, for example, the McBurney operation for inguinal hernia. Theoretically, it seemed an ideal operation. Yet experience proved it to be of little value, because it failed to take into consideration the fact that scar tissue subjected to pressure or tension has the power of stretching or yielding indefinitely. Many of the more complicated methods for femoral hernia, while they may be theoretically and mechanically correct in principle, depend for their success upon some seemingly minor factor which is given too little consideration, yet which may completely annul their supposed superiority. This is well illustrated by those methods in which the canal is perfectly closed and obliterated by means of metal nails or silver-wire sutures; yet, the very presence of these foreign bodies often brings about secondary sinuses with suppuration, which, in turn, may be the chief cause in producing a relapse.

As to the Gordon method, so strongly advocated by Bacon and Kammerer, as well as the other methods of closing the femoral ring from the inner side, necessitating opening the inguinal canal, the possibility of an inguinal hernia resulting from an attempt to cure the femoral should not be lost sight of. Not a single surgeon has reported more than an insignificant number of cases operated upon by any of these methods, and in none of the reports were the cases traced for any length of time.

While we may be willing to grant the truth of the statement of Bacon that "it is far better to follow a mechanically correct paradigm than to practise an operation whose mechanical deficiencies must be supplemented by peculiar skill or extraordinary experience on the part of the operator," yet, it must be conceded that, if the success of the simpler operation of Bassini and the purse-string methods depended upon peculiar skill or extraordinary experience on the part of the operators, how much greater skill and experience would be required to successfully perform an operation like the Gordon method, for the understanding of which Bacon himself has thought it necessary to devote seven pages of description?

The value of an operation for femoral hernia, as the value of all operations in surgery, should, I believe, be estimated not by trying to ascertain how nearly it fulfills certain theoretical considerations, however important they may appear to the individual surgeon, but by finding out to what extent they meet two very practical tests: (1) simplicity, including safety; (2) efficiency, that is, permanence of cure.

Of two methods of operation giving equally good results, that method which is the simpler and more easily performed should have the preference.

In addition to the numerous operative procedures already in vogue for the cure of crural or femoral hernia, we find still another method

described by Sprengel¹ in his "Contribution to the Technique of the Operative Treatment of Crural Hernia" read before the XXXV Congress of German surgeons.

This method is limited to crural hernia in the female and is advocated by its author only in very large or relapsed hernias. Briefly stated, the method consists in an attempt to effect a cure of the hernia by laparotomy, with closure of the hernial opening from within by the use of the round ligament. The various steps are as follows:

Exposure of the hernia by means of a longitudinal incision in the direction of the crural canal. Opening of the hernial sac; revision of same, provisional tamponade. Laparotomy incision along the rectus muscle, pushing back the gut so that the isolated pelvic organs only are in view. Introduction of a closed Mikulicz forceps through the crural canal. Inversion of the hernial sac into the abdominal cavity, firm suture of the folded sac to the parietal peritoneum, and complete

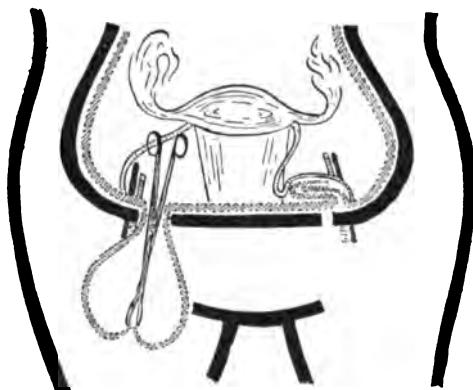


FIG. 2.—Sprengel's method.

closure of the ostium internum by means of this tissue plug. The latter may be strengthened by firmly suturing together the round ligament with the inverted hernial sac. Complete closure of the abdominal layers; suture of the hernial incision without regard to the hernial opening.

Sprengel has performed the foregoing method five times with entirely satisfactory results, the wound healing by primary union in every case and the patients leaving the hospital within three weeks. A truss was not prescribed in any case.

Examination from three to eleven months after operation showed the same perfect result. One of the cases could not be traced.

My only comment upon this method of operation is that already made upon the complicated methods in general, that it is unnecessary,

¹ Arch. f. klin. Chir., 1906, Bd. lxxx.

and that before it could be seriously proposed to adopt such methods the failure of the simpler procedures should first be proven.

Referring to Bähr's¹ article on "External Crural Hernia," published in 1898, containing a report of 3 cases of this variety of hernia, Axhausen² states that these cases were confirmed neither by operation nor autopsy, a defect which they share with the older 6 cases of Macilwain; nor does he believe that any case so confirmed has been published since Bähr's article. Axhausen then gives a rather complete report of a case of true external crural hernia operated upon by him at the University Clinic in Kiel. In this case the hernia had become incarcerated several times, an occurrence which, hitherto, has been considered as very unlikely in this variety of hernia, in view of its shape (Bähr, Narath³).

The hernial sac was found below Poupart's ligament, entirely separated externally from the femoral and epigastric vessels, from iliac muscle and the crural nerve by the anterior iliac fascia s. ileopectinea. The vasa circumflexa ilei did not appear on dissection. The hernial opening had the shape of an entirely acute-angled triangle and the shape of the sac corresponded to that of the opening. The peritoneal protrusion lay free in the fatty tissue, occupying the space between the two fascia layers.

Axhausen gives the views of the various authors as to what constitutes an external crural hernia, from which it appears that their conceptions are widely at variance.

Graser⁴ points out that the term "external crural hernia" may apply to:

1. Hernias situated externally to the femoral artery.
2. Hernias which are situated laterally from the point of divergence of the epigastric artery.
3. Hernias which do not occur in the lacuna vasorum, but in the lacuna musculorum.

Referring to his own case, Axhausen mentions the following characteristic points in which it differed from other varieties of crural hernia:

1. Location of the neck of the hernial sac exclusively to the outside of the large vessels; the juncture of the ileopectineal ligament and Poupart's ligament form the extreme outer point and correspond to about the middle between anterior superior spine and the large vessels; the sheath of the vessels forms the extreme inner point.

2. Location of the hernial sac below the superficial layer of the fascia lata and above its deep layer.

3. The behavior of the circumflex iliac artery, which passes behind the neck of the hernia sac.

¹ Der äussere Schenkelbruch, Arch. f. klin. Chir., Band lvii, S. 59.

² Über den äusseren Schenkelbruch, Deutsche Zeitschrift f. Chir., 1906, Band lxxxii, S. 96.

³ Über eine eigenartige Form von Hernia cruralis (prævascularis), Arch. f. klin. Chir., Band lix, S. 396.

⁴ Handbuch der prakt. Chir.

Operative Treatment of Inguinal Hernia in Children. A very strong plea for prompt operative intervention in all cases of hernia in infants and children is presented by Bühlmann¹ in his article, "On the Operative Treatment of Inguinal Hernia in Children." The same covers 144 operations in 117 patients, done principally at Jenner's Hospital for Children, Bern, by Tavel's method, from 1902 to 1905.

Of this series 107 were boys, 10 girls; and 28 were double, 65 right, and 51 left hernias. The double hernias were operated upon in one sitting.

As regards the age of the patients, he states that 48 were below eight months; 10 were from six to twelve months; 23 from one to two years; 10 from two to five years; 20 from five to fourteen years. The youngest patient was a prematurely born boy, eight days old.

Incarceration was observed in 8 cases.

The vermiform process was found in the hernial sac in 7 cases, once in a left hernia; the ovary and tube in 4 cases.

As regards heredity, enquiry was made in 45 cases; in 34 there was a history of hernia in the family; in 11 the answers were negative; 20 of the cases were prematurely born.

As far as noted in the hospital records, truss treatment had been tried in 43 cases without success.

A relapse was observed but once in the entire series of 144 operations, and this was in a child born three months before term with a congenital umbilical hernia containing stomach and liver which had been successfully operated upon; but soon after the mother noticed a double inguinal hernia with very wide openings. Operation was done, and three months later a relapse was noted on the right side, which was then definitely cured by a second operation.

While 8 of the 117 patients are reported to have died since operation, of various diseases, only 1 death, occurring eight days after operation, which latter had been strongly advised against on account of the child's weak condition, was due to the operation.

In none of the cases traced was atrophy of the testes observed.

As to wound healing, it is stated that infection took place in five instances, once in the presence of eczema, twice in incarcerated hernia that demanded immediate operation and, hence, rendered impossible proper disinfection; in the other 2 cases there was only very slight stitch-hole ulceration.

The main steps of Tavel's method are briefly as follows:

1. Incision parallel to Poupart's ligament above the neck of the sac.
2. Longitudinal incision of tunica communis.
3. Loosening from the sac the elements of the cord, which are usually found to have been scattered.
4. Pulling forward and detaching sac from the inguinal canal, care-

¹ Deutsche Zeitschrift f. Chir., July, 1906.

fully handling and placing sideways the vesico-umbilical ligament, which is often pulled forward with the cord.

5. Ligation and division of sac (silk No. 3), the stump being allowed to slip back into the abdominal cavity.

6. Suture of Poupart's ligament anteriorly to the cord with three interrupted silk button sutures.

7. Ligature of the caught vessels (silk No. 2).

8. Continuous suture of skin with straight needle.

9. Vioform or iodogallicin dressing.

The time needed for this operation, if no complications be present, is ten to fifteen minutes; for a double hernia it takes twenty to thirty minutes.

Bühlmann considers his method the simplest, most effective, and safest procedure known.

His conclusions are: 1. That truss treatment of hernia, even in earliest childhood, affords absolutely no assurance of radical cure.

2. Only by operation can a reliable and radical cure be obtained. Operation is indicated as soon as a hernia becomes apparent, regardless of the age of the child.

3. The earlier operation is done, the less difficulty it presents technically, on account of the absence of adhesions.

4. Direct hernias are seldom, if at all, seen in children under one year. This is fully explained by the existing anatomical conditions in the newborn, as described by himself.

In connection with his conclusion No. 1, he states that the assumption, which has never been proven, that children are cured by truss treatment, probably often deters surgeons from operating upon young children with free hernia. The purpose of the truss, in all its various constructions, is to exert pressure upon the neck of the hernial sac; and, by thus irritating its walls, to secure adhesion or union. Now, if in the case of a one-year-old child a double truss be worn day and night for one to three years, and a guarantee be possible that the hernia will not come down once in all this time, then a cure would be possible, although only too often it would be but a seeming cure. However, granted that through the pressure exerted by the truss the processus vaginalis becomes obliterated as far as the inguinal canal, it would still be impossible for the truss to effect obliteration of the properitoneal sac of the hernia, or the protrusion of the peritoneum into the internal inguinal ring. Hence there remains, at best, a predisposition to relapse in all these apparently cured cases. Besides, the assumed obliteration does not by any means always occur, and the sac is often found open in cases alleged to have been cured by truss.

I would take issue with several of Bühlmann's conclusions. First, the statement that truss treatment in earliest childhood affords no assurance of radical cure.

Since my connection with the Hospital for Ruptured and Crippled, we have observed, at the out-patient department, upwards of 17,000 cases of hernia in children, and our experience has forced us to conclude that in children, particularly under the age of one to two years, the great majority are cured by *truss treatment*. While it is impossible to state definitely the exact percentage, we think two-thirds is a conservative estimate. Ochsner goes still further, claiming that 95 per cent. are cured by truss treatment; De Garmo believes that 75 per cent. are thus cured. While Bühlmann is correct in saying that some of these cases afterward relapse, the histories of older children and adults show that the great majority of the hernias of infancy do not relapse.

Bühlmann's conclusion No. 4, that direct hernias are seldom, if at all, seen in children under one year, is in harmony with our experience. I will even go farther, and say that I have never seen a single case of direct hernia under the age of fourteen years, and only 1 case in the female sex at any age. As to the claims made that Tavel's method is the "simplest, most effective, and safest," further proof is needed; certainly as to the permanency of cure. It is no safer than the Bassini operation, and as to simplicity, the Bassini method can easily be performed in ten minutes.

Carmichael,¹ discussing some varieties of hernia in children, gives the result of his experience covering 152 consecutive cases operated upon for radical cure: 44 of these were under one year of age; 67 between one to five years; 22 over five years of age.

In 19 cases operation was done for inguinal hernia in the female. The youngest cases were 2 infants two and three weeks old, respectively, who were operated upon for strangulation. He states that it is customary to delay operation until the fourth, sixth, and eighth month for two reasons: (1) to enable the child to get a start in its feeding; (2) because in 75 per cent. of cases it is found to be advisable to circumcise it in order to facilitate the after-treatment.

The age of choice, according to Carmicheal, can be set down at from four to eight months.

As I have already stated in reviewing the paper of Stiles, of Edinburgh, on the operative treatment of hernia in young children, I am strongly opposed to extending the field of operative treatment to include infants and very young children. There are two reasons urged against this extension: First, the risk is unquestionably greater in infants than in older children and adults, although Carmicheal was so fortunate as to have no death in his series. Stiles reports 3 deaths in 360 cases.

The second reason is the fact that is generally accepted by persons who have had a large clinical experience with the mechanical treatment of hernia, that a very large proportion are cured by truss treatment.

¹ British Medical Journal, February 3, 1906.

At the Hospital for Ruptured and Crippled we do not operate upon children under the age of four years, except in the very rare cases in which there is a history of strangulation, and the still rarer cases in which we are unable to perfectly control the hernia with a truss. There is little to be lost by using a truss during the period of infancy; a large proportion are cured, and those that are not can be operated upon with greater safety at the end of this time than before.

With regard to mortality, Carmichael reports but 1 death in his series of 152 cases. This occurred in a delicate child, three weeks old, operated upon for strangulation. This, however, should hardly be counted in the mortality statistics for radical cure of hernia.

These cases, operated upon at so early a period of life, are important as bearing on the congenital origin of hernia. Macready states that only 8 per cent. of hernias are congenital.

Of the 44 cases operated upon under the age of one year, the majority were seen within the first two months after birth. Carmichael believes that most of these were true congenital hernial sacs, or such as showed a marked congenital predisposition to the formation of hernia. The type of sac in 39 of these cases was funicular, while in only 5 it communicated with the tunica vaginalis. A complete vaginal sac, *i. e.*, communicating with the tunica vaginalis, was present in only 7 cases of the 133 radical cures performed. Carmichael states that whether all these are to be considered congenital in origin or not, it is interesting that the commonest form of sac in congenital hernia is the funicular sac.

This brings up a point upon which there has been a great deal of confusion among surgical writers, namely, the question as to what constitutes a *congenital hernia*. Walsham and others regard as congenital a hernia in which the sac communicates with the tunica vaginalis. There is a growing tendency to include among congenital hernias those in which there is present in the canal a funicular or preëxisting congenital sac. Such a sac, according to Hamilton Russell, is found in over 75 per cent. of cases of congenital hernia.

In 6 of Carmichael's series of 152 cases operation was done for strangulation; 5 were under the age of one year. All occurred on the right side.

The contents of the sac are exceedingly interesting:

Cecum and appendix	9
Small intestine	8
Bladder	3
Omentum alone	2
Sigmoid	1

The appendix was removed 7 times, being healthy in 5, tuberculous in 1 and containing a fecal concretion in another; 3 cases of bladder hernia occurred, 1 a child aged four months, 1 three years, and 1 eleven months. In 2 cases the bladder was simply seen on the inner

side of the neck; in the third case a swelling was found filling up the whole inguinal canal, which, on being opened, proved to be the bladder. Carmichael believes that the bladder is present in 1 per cent. of inguinal hernias. This has not been my own experience. I have observed the bladder in less than 0.5 per cent. of the cases operated upon.

Tuberculosis of the sac was seen 4 times; the ovary and Fallopian tube were found in 2 cases, 1 of the latter being thirteen months, the other three years old.

Carmichael points out the fact, which I have myself observed, that it is not always easy to reduce the ovary and tubes into the abdomen in those cases in which they are lying well down in the sac. In both cases Carmichael divided the two folds of peritoneum forming the broad ligament, in order to reduce them.

The Anatomy of the Inguinal Region has been recently carefully studied by Witherspoon,¹ of St. Louis. Witherspoon's conclusions are based upon 50 dissections and are summarized as follows:

"The internal abdominal opening is located in the extraperitoneal fatty tissue.

"Hesselbach's ligament is formed by fibrous bundles which connect the outer end of the semilunar fold of Douglas with the inner margin of the internal abdominal opening. These bundles are developed chiefly in the extraperitoneal fatty tissue. Along the route of these bundles there exists between the fatty tissue and the transversalis fascia a close union. During intra-abdominal pressure, Hesselbach's ligament, due to its resistance, helps to increase the size of the internal abdominal opening.

"In the inguinal area the internal surface of the abdominal wall is divided into two planes by Hesselbach's ligament. Normally, the plane lateral to this ligament is only slightly anterior to the plane median to the ligament. When the muscles of the lateral plane are weakened by disease or are enfeebled through advanced age, intra-abdominal tension greatly exaggerates this difference. As the internal abdominal opening is situated at the junction of these two planes, the greater the difference, the more patulous the opening and the greater the possibility of escape of a viscus through the opening.

"The transversalis fascia does not join Poupart's ligament at any point. The deep crural arch is formed by the junction of the transversalis and cremasteric fascias in the arch in front of the external iliac vessels as they pass into the thigh. The free (posterior) edge of Gimbernat's ligament is just external to and parallel with the deep crural arch.

"The fibrous bundles which pass out of the pelvis into the so-called conjoined tendon give to the abdominal wall its chief strength internal (posterior) to the inguinal canal. The aponeurosis of the transversalis

¹ Journal of American Medical Association, May 19, 1906

muscle strengthens the wall just internal (posterior) to the external abdominal ring.

"The base of the so-called conjoined tendon, the lateral margin of which is formed by the fibrous bundles which enter the tendon from out of the pelvis, is the constricting agent in femoral hernia. A Spanish surgeon, Gimbernát, attributed this agency to the structure which has since been given his name.



FIG. 3.—Dissection of left inguinal region, showing: A, External oblique muscle; B, cremasteric muscle from transversalis; C, internal opening of the inguinal canal through the transversalis fascia; D, transversalis fascia; E, fibers out of the pelvis which pass into the so-called conjoined tendon; F, aponeurosis of the transversalis muscle; G, internal oblique.

"The so-called conjoined tendon was in no instance formed by a union of fibers from the internal oblique and transversalis muscles in the subjects dissected. Judging from the usual anatomical arrangement this union seems quite possible.

"The external abdominal ring is situated between the dividing fibers of the aponeurosis of the external oblique muscle. The external abdominal ring is situated in the peri-aponeurosis which covers the external abdominal opening."

Radical Operations for the Cure of Inguinal Hernia. In a recently published article Brenner¹ states that it is owing to Bassini's method that the radical operation for inguinal hernia has become the common property of the surgeon. Brenner reports the results of operations performed at the General Hospital in Linz (Austria) from 1892 to 1903.

During this period 1188 individuals (1080 men and 108 women) were treated by operation, and as the majority were operated upon on both sides, the total number of operations amounts to about 2000.

The operation employed was a modification of the original Bassini method, the main difference lying in the use of the cremaster muscle for the formation of the posterior wall of the inguinal canal. The advantage of this method, beyond the fact that it supplies an anatomical supplement of the internus, is the absence of all tension of the suture and of all traction upon Poupart's ligament. Brenner employs this method also in the female, as here, too, the anatomical layer of the cremaster is present, although it is often very thin. The only difficult step, he declares, is the separation of the round ligament from the hernial sac. He has of late practised high ligation of the neck of the sac, including a portion of the round ligament, but allowing a strip of the sac to remain attached to the ligament.

As regards the mortality, he reports 11 deaths in 1188 persons operated upon, which gives 0.9 per cent. This includes the incarcerated cases; excluding the latter and such that were due to wound infection, the mortality was *nil*. There were 5 deaths in the non-strangulated cases, or a mortality of 0.4 per cent.

The average time the patients were required to remain in the hospital was 17.7 days.

With reference to the age of the patients, his table shows the same to have ranged between four months and seventy-six years, the decade between twenty to thirty showing the greatest number of cases operated upon; 2 operations were performed in infants below one year and 9 in persons over seventy years of age.

Usually the size of the hernias varied from that of a plum to a goose-egg; 115 times the tumor was larger, up to the size of a head.

In 105 of the cases the hernia was complicated with incarceration; of these 92 were men, 13 women, and operation resulted fatally in 6.

In 22 male and 4 female cases inguinal and crural hernias were found in the same individual; inguinal and umbilical hernias were observed only once in the same individual.

The sigmoid was found in the hernial sac in 20 cases; the cecum in 40. The appendix was found in the sac and resected in 25 instances; in 4 cases of incarcerated hernia radical operation was done after resection of the gut.

¹ Arch. f. klin. Chir., vol. lxxix, p. 1080.

Brenner, like Goldner, has adopted the plan of operating on both sides in all cases, and he states that in 889 cases which were operated upon bilaterally a hernial sac was found on the opposite side, though often very small, in 520 cases. In the 369 cases in which a sac was found on one side only, the same was on the right side 236 times, on the left 133 times.

Operation was done on one side only in 122 cases, and in these the hernia was on the right side 90 times, on the left side 32 times.

In comparison to oblique hernia, which alone, owing to its relation to the processus vaginalis, has any right to the predicate "congenital," direct hernia is rare and of little significance. It was observed only 95 times in 1080 male and twice only in 108 female cases.

As regards results, it is stated that of 991 radical operations in the male—which figure does not include the operations in which no hernial sac on the opposite side was found on operation—910 (91.8 per cent.) were permanently cured; in 81 (8.2 per cent.) the results were unsatisfactory; of the latter 4.9 per cent. had a true relapse.

Of 82 radical operations in women, 78 (95 per cent.) were permanently cured; 1 had a relapse and in 3 cases the result was doubtful.

Taking the operations upon men and women together, we have 1073 radical operations with 988 (92 per cent.) permanent cures.

Reviewing his experience at the Linz General Hospital, he states that the population with which they have to deal undoubtedly shows great inherited predisposition to hernia, and that the development of a hernia is greatly facilitated by a protrusion of the processus vaginalis peritonei on the one hand, and the atrophy of the layers of the inguinal canal on the other hand.

Signs which mark a hernial sac as a remnant of the vaginal process, in other words, as congenital, are abundant, yet there are, however, no signs that mark an oblique hernial sac as not preformed, but as the definite result of a trauma.

Pfister,¹ reports 300 operations for hernia. An interesting point connected with this series is that 105, or 35 per cent., of the whole number were large, irreducible hernias; 84 of these were inguinal, 16 femoral, and 5 umbilical. There was no mortality.

Considering the large number of difficult cases, the author is to be congratulated on the absence of mortality. The final results are not given.

Incarcerated Hernia. Lessing,² in his "Contribution to the Treatment of Incarcerated Hernia," reports the experience at König's (Berlin) clinic from March, 1896, to March, 1903, introducing his remarks by the statement that we have no special reason as yet to be proud of the

¹ New York Medical Journal, December 8, 1906.

² Deutsche Zeitschr. f. Chir., August, 1904.

results obtained in operations for incarcerated hernia, and adding that the blessings of antiseptic wound treatment, so noticeable in other branches of abdominal surgery, have apparently not been extended in the same measure to this fateful condition.

Lessing's report covers 165 cases, 9 of which were treated by taxis. In 156 operation was performed with a mortality of 27, 17.3 per cent.

With regard to the different varieties of hernia, it is stated that 59 were inguinal hernia, with 7 deaths, or a mortality of 11.8 per cent.; 91 crural, with 18 deaths, 19.7 per cent.; 3 umbilical, with 1 death, 33 per cent.; 2 obturator, with 1 death, 50 per cent.; and 1 ventral hernia which recovered. 104 operations were done in women, 52 in men, which figures confirm the experiences recorded by other authors. This great preponderance of female over male cases of incarcerated hernia is all the more conspicuous when we consider that, according to the large statistics of Malgaigne, Wernhers, and Berger, men are afflicted with hernia four times as often as women; however, the apparent incongruity is explained by the great proportion of crural hernia, which, as is known, show a special disposition to incarceration, and occur principally in women.

As regards the ages of the patients, only 2 of the female cases were below thirty years; 10 between thirty and forty; 24, forty and fifty; 26, fifty and sixty; 13, sixty and seventy; 11, seventy and eighty; 8, eighty and ninety; while of the male cases 16 were below thirty years of age; 9, between thirty and forty; 24, forty and eighty; 3, eighty and ninety; 57.3 per cent. of the entire number of herniotomies were done in patients above fifty years.

The influence of the age of the patients upon the prognosis of incarcerated hernia in general is shown by the fact that, of 67 operations done in cases below fifty years, only 3 (4.4 per cent.) died, while of 89 between fifty to ninety years of age, 24 (26.8 per cent.) ended fatally. The average age of the patients was 51.6 years.

Only 3 of the cases could be definitely pronounced congenital hernias; 3 were internal, direct hernias, all of which occurred in older patients. Simple reposition of the incarcerated gut was possible in 125 cases, 76.2 per cent. The death rate of the non-gangrenous cases of incarcerated hernia was 14, 11 per cent.; 35 of the cases are reported to have been complicated with *gangrene*—i. e., 10 inguinal, 23 crural, and 2 umbilical; in other words, gangrene was observed in 25 per cent. of the cases of crural hernia against 17 per cent. of the total number of inguinal hernia.

The mortality in the gangrenous cases was 37.1 per cent. (13 out of 35), which percentage compares favorably with that of other statistics: e. g., Petersen, 48 per cent.; Weyprecht, 46.6 per cent.; Rothe, 54.28 per cent.; Hilgenreiner, 51.7 per cent.; Crampe, 42.5 per cent.; Hofmeister, 44 per cent.

Lessing remarks that if 5 cases of postoperative gangrene, in which the gut was in a precarious condition when replaced, with 3 deaths, were included, this would make the result less favorable, namely, 40 gangrenous cases with 18 deaths, 45 per cent. However, as this was not done in any of the statistics cited, the comparative result would not be greatly changed.

With regard to the method of operation Lessing states that in the great majority of non-gangrenous cases radical operation was added, *i. e.*, Billroth's method being employed for the crural and Wölfler's for the inguinal hernias.

As to the gangrenous cases, radical closure of the hernial opening could be performed in about one-third of the cases; in 9 resection was done and in 9 others an artificial anus was established.

Concerning late results, Lessing states that their efforts at tracing patients resulted so unsatisfactorily that no conclusions of value could be drawn from the meagre information received.

The Treatment of Gangrenous Inguinal and Femoral Hernia. Bärlocher,¹ in his article, inserts some statistical data taken from the last twenty-five annual reports of the St. Gallen (Switzerland) Hospital, showing the interesting fact that the number of operations for free hernia has increased twelvefold since the advent of asepsis. While from 1881 to 1890 only 82 free hernias were operated upon, in the next ten years 724 operations are recorded, and from 1900 to 1905, 758. The number of operations for incarcerated hernia has remained about the same within the last twenty years.

The total number of operations for free hernia from 1881 to 1905 is 1564, *i. e.*, 1396 inguinal and 168 femoral; for incarcerated hernia, 264, namely, 124 inguinal and 140 crural. Of the inguinal 109 occurred in men, 13 in women; of the crural, 127 in women and 15 in men.

Bärlocher reports 43 cases in which the undoubtedly gangrenous gut demanded direct operative treatment; 16 of these were inguinal and 27 crural hernias.

The mortality in the 43 gangrenous cases was 58 per cent. (25 deaths), a proportion which does not differ very much from that of other authors: von Mikulicz, 104 deaths in 162 cases, 64 per cent.; Hofmeister, 200 deaths in 381 operations, 62 per cent.

The operation of establishing an artificial anus was done only seven times, in cases in which resection was not feasible, and all of these resulted in death.

The decision as to whether the gut should be replaced or resected he believes to constitute one of the most difficult questions in the technique of the operation for incarcerated hernia. He reports 16 fatal cases in which death may be ascribed to secondary gangrene of the gut

¹ Deutsche Zeitschrift f. Chir., July, 1906.

that had seemed in sufficiently good condition to be replaced at the time of operation.

Deducting the 7 cases in which an artificial anus was established, there remain 36 cases of gangrenous hernia in which resection of the gut was done; 18, or 50 per cent., of these recovered.

In all cases of primary resection the gut was drawn forward and resected proximally to the hernial opening. Twice it was necessary to overcome a fecal fistula that had appeared at the site of the primary operation after replacing a suspicious portion of gut. This was done by means of an oblique incision above the inguinal canal; in two other cases resection of a secondarily gangrenous portion of gut was accomplished by laparotomy in the median line.

In the other cases in which resection was done from the hernial opening the afferent and efferent portions of gut were temporarily tied by means of gauze strips, and none but absolutely well nourished and healthy gut was retained, care being taken that not the slightest portion of the gut end of the mesentery was missing and that the gut was divided at a place where no more thrombi were found in the mesenteric vessels.

Umbilical and Ventral Hernia. Graser,¹ in a paper read before the LXXX Congress of German Surgeons, while not claiming to have discovered a new method, relates his personal experiences with the transverse fascia incision according to Pfannenstiel, applied to umbilical and ventral hernia. The main points are: transverse incision of the fascia, separation of same from the muscular layers; division of the recti into posterior and anterior sheath; vertical suture of the unsheathed rectus muscles; layer suture.

Graser reports 4 cases operated upon by him within the last year; 3 of the cases were of exceedingly large size; the fourth was only about the size of a fist, but the shrinkage of the straight abdominal muscles was considerable.

CASE I.—Mrs. Z., aged thirty-two years; since the birth of her last child, half a year ago, she has been in a deplorable condition, being hardly able to walk. Operation after several weeks' preparatory treatment, May 2, 1905; incision 45 cm. long. The patient left the hospital on May 24, and when last examined, in March, 1906, was found in absolutely perfect condition.

CASE II.—Mrs. H., aged forty-seven years, operated upon in July, 1904, for an umbilical hernia the size of a child's head (Condamine-Bruns' method). Relapse six months later. Present operation, October 26, 1905. Patient was dismissed from the hospital November 25, with a very solid scar, 34 cm. in length. When last examined, in March, 1906, the patient was found in excellent condition.

¹ Arch. f. klin. Chir., 1906, Band lxxx, Nr. 2.

CASE III.—Mrs. W. H., aged fifty-six years; hernia for fifteen years with pronounced diastasis of recti muscles. Operation July 7; dismissed August 1. Examination March, 1906: scar sound.

CASE IV.—Mrs. D., aged thirty-two years; had been operated upon for ventral hernia three times before. Operation January 27, 1906. Incision 45 cm. long. The patient left the hospital February 26 and reëxamination by the end of March showed her in perfect condition.

Graser advocates careful preparatory treatment in all cases, one feature of which consists in placing upon the patient's abdomen a bag



FIG. 4

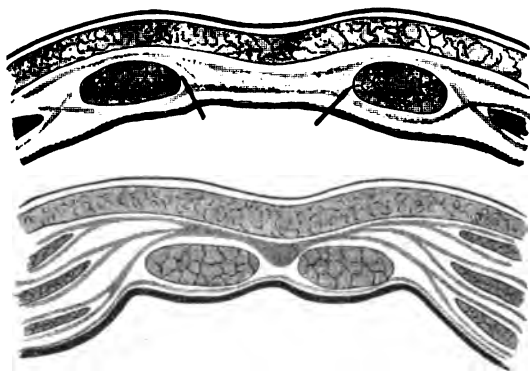


FIG. 5

of shot weighing about fifteen pounds, in order to gradually prepare the abdominal cavity for the eventual reduction of the viscera.

Graser believes that the good results of the operation are due to the reëstablishment of the original anatomical conditions of the abdominal wall, with the united action of the muscles and aponeuroses; the firm union of the healthy muscles with the anterior sheath he considers a special advantage of the procedure.

Graser's operation has some points in common, both with Mayo's operation for umbilical hernia and Blake's, the transverse skin incision being the same as Mayo's and also the transverse fascia incision. I do

not think, however, that it is possible, in the great majority of large umbilical hernias in women, to dissect out and unite the recti muscles, as advised by Graser. In these cases the recti are usually widely separated and much thinned, and it must be extremely difficult to perform the operation in the ideal way as shown in the cuts (Figs. 4 to 10). Theoretically, the operation certainly seems ideal and it remains to be seen whether the

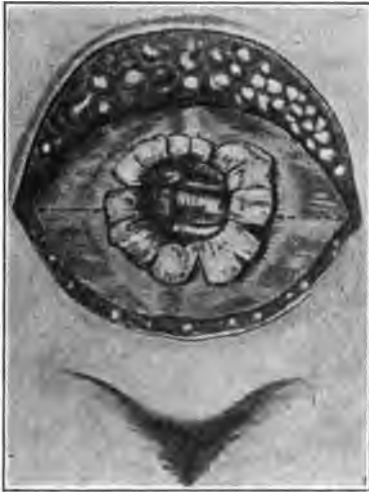


FIG. 6

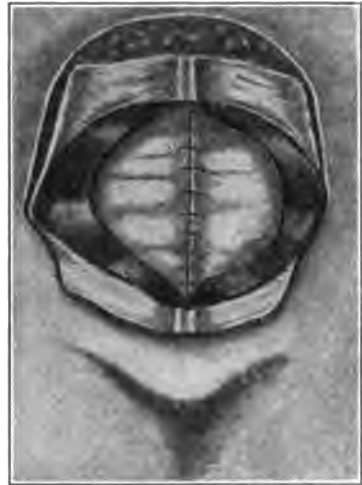


FIG. 7



FIG. 8

practical results will compare favorably with the overlapping operation. In the cases in which the method can be performed in the manner described by Graser, I believe that it has some advantages over the Mayo operation, although thus far the latter has given almost perfect results in cases which hitherto have shown a very large percentage of failures from earlier methods of operation.

The Use of Silver Wire for the Cure of Large Hernias has again been recently advocated by Wiener.¹ This method was first described by Witzel and Goepel, and later by Willy Meyer, Bartlett and Perry, whose articles have already been referred to in earlier articles in *PROGRESSIVE MEDICINE*.

Witzel used silver-wire sutures alone; Goepel was the first to make use of the ready-made silver-wire filigree. The form of filigree used by Wiener was that described by Bartlett.² Wiener believes that the filigree should overlap the opening by at least one inch all around, each cross-wire ending in a loop, thus avoiding sharp ends. He thinks it is better to depend on two layers of silver, either two filigrees in different

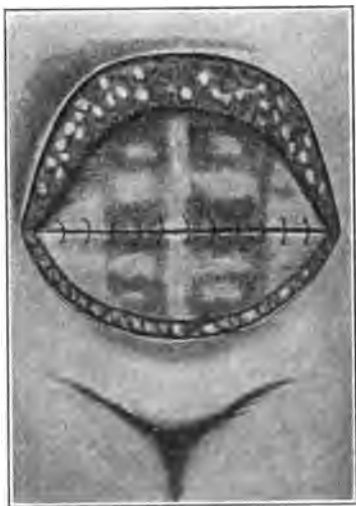


FIG. 9



FIG. 10

planes, or one reinforcing layer of silver sutures plus the filigree. Wiener reports 7 cases and states that it has not been necessary in any case to later remove the wire:

CASE I.—Male, aged fifty-three years, with a large inguinal hernia recurring from a previous operation. The contents of the hernia were badly adherent; operation was difficult and prolonged. The inguinal ring was narrowed by purse-string suture, and the wire filigree sutured over the canal. The patient had nausea and vomiting, increasing restlessness and cyanosis developed, and he died on the sixth day, death being due, in the opinion of the operator, to the inability of the abdominal cavity to accommodate itself to the large amount of intestines that had been previously in the sac.

¹ *Annals of Surgery*, April, 1906.

² *Ibid.*, 1903.

CASE II.—Female, aged thirty-four years; ventral hernia following operation in October, 1900. The present operation was performed in October, 1904, and the patient is reported well sixteen months after, no trouble having resulted from the silver wire.

CASE III. Male, aged thirty years. Operation in January, 1905, for left inguinal hernia of one year's standing. After-result not stated.

CASE IV.—Male, aged thirty-seven years. Operation in May, 1905, for ventral hernia; silver-wire filigree $2 \times 3\frac{1}{2}$ inches being used. Immediate result, primary wound healing. Late result, not stated.

CASE V.—Female, aged twenty-four years; ventral hernia following appendicitis operation. Operation July 12, 1905. A coil of gangrenous gut was resected; the abdominal wound closed with silver wire, but no filigree used. There was fecal discharge for two weeks. The wound healed in five weeks. No relapse at the time of the report.

CASE VI.—Female, aged thirty years; umbilical hernia. Silver-wire suture without filigree. Slight recurrence three months later.

CASE VII.—Female, aged twenty-seven years. Silver-wire filigree to close aperture resulting from removal of fibroma of the abdominal wall in the right hypochondriac region, in October, 1905. Result not traced, operation being done only a few months before the report of the case.

Wiener believes that silver filigree, if correctly made and correctly introduced, will seldom have to be removed. If, in addition, two separate filigrees in different planes are introduced, he states that a large majority of otherwise inoperable hernias will be radically cured.

Wiener's cases, if viewed from the standpoint of immediate results following operation, must be conceded to have been successful; but they are open to the same objection that I have, in earlier numbers of *PROGRESSIVE MEDICINE*, urged against the cases of Bartlett and Meyer. In none of the series of cases thus far published has sufficient time elapsed to enable one to determine the efficiency of the method as regards permanent cure. Most of these cases have been traced less than six months; only a few beyond a year.

Personally I believe that any foreign body, be it silver wire or anything else in the form of suture or filigree, introduced into the muscular planes of the abdominal wall for the cure of hernia, is apt to cause sinus formation sooner or later, necessitating the partial or complete removal of the offending body, finally leaving the patient in a worse condition than that for the relief of which the operation was performed. I have known such non-absorbable sutures to cause trouble and require removal as late as three years and eight months after introduction. I believe that any ventral or umbilical hernia of such large size that the defect cannot be closed by the overlapping methods of Mayo or Blake, had better be left without operation.

The Descent of the Testis During Fetal Life, Schönholzer¹ states, has received considerable attention of late, and many hitherto dark points have been cleared up and antiquated views changed by the excellent works of Bramann and Weil. It is particularly the behavior of the gubernaculum Hunteri and the processus vaginalis that has been definitely determined. The former, while heretofore considered of only passing existence, is now known to continue after fetal life, its tissues, by inversion, becoming part of the processus vaginalis, thus forming the coverings for testicle and cord. Hence, as has been fully proven by Bramann, the cremaster is formed out of the muscular structure of the gubernaculum.

During the last twenty years 42 cases of cryptorchism or monorchism have been observed at the Zürich Clinic, and operation was performed in the majority of cases.

As regards the frequency of cryptorchism, only relative statements can be made, since patients do not seek the physician's aid unless the condition is very troublesome or complications are present. According to Finotti² in a series of 380 male cases operated upon for inguinal hernia, the latter was complicated with an inguinal testicle 14 times. Ravoth found cryptorchism in 51 of 1650 cases of inguinal hernia. Lanz reported 5 monorchists in 750 recruits nineteen years of age.

As a rule, the trouble is unilateral. At Krönlein's clinic it was noticed on the right side 17 times, on the left 20 times, and on both sides in 4 cases.

As to the age of the patients, Schönholzer's report shows that 2 were between one and ten years; 26, eleven and twenty; 8, twenty-one and thirty; 4, thirty-one and forty; 2, forty-one and fifty; the second decade furnished the largest number of cryptorchists.

Undescended testis is most frequently observed in infants and newly born babies. It is known that the descent of the testis is often accomplished after birth. It may also happen that the testicle ascends again, as was seen in 1 of the cases reported by Schönholzer.

In 39 of the 42 patients with undescended testis a hernia was present on the respective side and this was congenital in every instance; 1 case showed an acquired hernia on the side of the normally descended testis; 1 had bilocular hydrocele.

Of special interest among these 39 cases complicated with hernia are 4 of inguino-properitoneal hernia, 1 inguino-interparietal, and 1 inguino-interstitial hernia.

Regarding inguino-properitoneal hernia, Krönlein claims that in the majority of cases the condition develops from a congenital inguinal

¹ Krönlein's Clinic, Zürich. *Über Kryptorchismus*, Bruns' Beiträge f. klin. Chir., 1906, Band xlix.

² Arch. f. klin. Chir., Band lv.

hernia, especially if the descent of the testis is incomplete or has been completed after birth.

Of 23 cases of inguino-properitoneal hernia observed by Krönlein, a congenital hernial sac was found in 15 and in 9 of these the hernia was associated with undescended testis.

Breiter¹ collected 58 cases of this variety of hernia with incomplete descent of the testis in 23.

Hernia inguinalis interparietalis, a very rare form of inguinal hernia, is usually found in conjunction with ectopia of the usually atrophic testicle, and then almost invariably in the presence of incarceration.

Gobell, in his report covering 280 such cases, fully describes the anatomical relations of this form of hernia; he distinguishes three varieties—(1) hernias between internal and external oblique; (2) hernias between internal and transverse oblique; (3) hernias between transversus and fascia transversa—of which the first is most frequently encountered. The fact that this form of hernia usually accompanies an imperfectly descended testicle proves that its development is favored by congenital conditions.

Atrophy of the testis was noted in three-fourths of the cases operated upon at the Zürich Clinic.

Schönholzer states that in all cases of acute orchitis and periorchitis of indefinite origin, in painful crises with swelling of the testicle and inguinal region, not infrequently seen in retention of the testicle, in inflammatory exudation into the processus vaginalis, in many cases of apparent incarceration, torsion of the cord should be thought of and duly taken into consideration in case of an operation.

With regard to the method of operation, it is stated that castration was performed in 13 cases; most of these were between 80 and 90 years of age and showed badly atrophied glands; orchidopexy was done in 3; in 17 cases the testicle was transplanted into the abdominal cavity, in the properitoneal tissues within the abdominal layers; 7 patients were unwilling to submit to operation.

Orchidopexy was done only three times, because of the unsatisfactory experience they have had with this procedure. Whenever an inguinal testicle, after splitting of the tunica vaginalis communis and processus vaginalis, cannot be easily placed in the scrotum without too great tension of the isolated cord, Krönlein transplants the same together with a portion of the processus vaginalis into the properitoneal connective tissue within the abdominal coverings. The hernial sac is previously closed either by purse-string suture or, if feasible, by puncture and double ligation; the entire inguinal canal is then closed according to Bassini's method.

This method was successfully employed in 17 patients. While it is

¹ Bruns' Beitr., Band xiii.

not an ideal procedure, Schönholzer states that one has to choose the lesser of two evils, and an important advantage of the method is that it saves from castration all such cases in which orchidopexy is impossible.

TREATMENT OF UNDESCENDED TESTIS. In spite of the fact that considerable has been written in recent years upon the treatment of undescended testis, usually accompanying inguinal hernia, there is still by no means a unanimity of opinion as to the proper method of dealing with it. At the recent French Congress of Surgery ectopia of the testicle and its complications was one of the main subjects of discussion. The principal paper was read by Villard,¹ of Lyons. He stated that although many theories had been offered in explanation of this condition, such as the smaller dimensions of the scrotum, peritoneal adhesions, obliteration of the external orifice of the inguinal canal, shortness of the elements of the cord, malformation in the development of the gubernaculum, none of these explain the first cause of the arrest of development. Villard thought it possibly might be due to some hereditary influence, inasmuch as ectopia is so frequently found among degenerates. He stated that in all cases there were marked changes in the epithelial elements of the seminiferous tubes, even in cases in which the testis had reached almost normal size. While histological examination showed very marked changes in the epithelial elements the interstitial portion of the gland was often fully developed. This is in full accord with physiological observations, for cryptorchids are nearly always sterile, although they attain virility.

The surgical operations to relieve this condition Villard groups under the one common name of *orchidopexy*. He does not think that operation is always indicated. He would not operate in the abdominal variety of ectopia for the reason that the operation is difficult and dangerous and the result uncertain. In simple cases, not complicated with hernia, he would not interfere until the age of ten years, and would then close the canal by Bassini's method. In cases in which the condition is unaccompanied by a hernia, he believes immediate operation indicated. The most important steps of the operation he considers to be lowering of the testicle and fixation.

The value of the various methods that have been reported, Villard holds, depends chiefly upon getting the organ well down.

He has operated upon 116 cases with 56 perfect results, 42 doubtful, and 18 failures. As a result of the operation there is usually a disappearance of the pains and increase of the virility of the individual, but the influence upon spermatosis is practically *nil*.

Souligoux, of Paris, believes that, from a pathological standpoint, there are two varieties of ectopia of the testis; the one due to an arrest of development or malformation of the testicle itself; the other due to

¹ Revue de chir., November, 1906, No. 11.

malformations connected with structures outside of the testis, such as premature obliteration of the vaginal process of peritoneum, adhesions in the upper portion of the canal around the internal ring, abnormal development of the cremaster muscle, and arrest of development of the scrotum.

Instead of waiting until the age of twelve and fourteen years, he would operate between six and eight years of age. In cases where a hernia complicates the ectopia, operation should be done at the earliest moment possible.

Kermisson, of Paris, reports 80 operations for undescended testicle between 1898 and 1905, without any serious complications. He considers fixation of the testis in the scrotum as useless and contents himself with placing the sutures around the cord from the canal up to the testicle.

As regards late results, 39 cases were examined. In 15 the testicle was in the scrotum; in 10 at the root of the scrotum; in 9 in the orifice of the inguinal canal. In 2 or 3 cases only was the testicle well developed. In 10 cases associated with hernia Bassini's operation was performed.

Girard, of Berne, employs fixation in the scrotum. He believes in operating at as early an age as two years.

The majority of surgeons believe it wiser to wait until the child is at least five to six years of age. Personally, I have operated upon upward of 100 cases of ectopia of the testis and, except in a few of the earlier cases, no attempt was made to fix the testis in the scrotum; but by careful freeing of the cord, very high up, the testis can usually be brought to lie in the scrotum or upper scrotum without tension. These cases have been almost universally associated with inguinal hernia and have been operated upon by the typical Bassini method, but omitting the step of transplanting the cord, in which way one to one and one-half inches are gained. There has been no relapse of the hernia in these cases, although in a certain proportion the testis has retracted up to the mouth of the external ring. In a few cases the testicle has continued to grow and has reached practically normal size, but the great majority show more or less atrophy. In only two instances has the testis been removed. These cases were both adults, one with a very small atrophied testis in the perineum, the other a case of abdominal ectopia, in which the testis could not be brought much beyond the internal ring.

ECTOPIA TESTIS TRANSVERSA, OR CROSSED ECTOPIA OF THE RIGHT TESTICLE. Halstead,¹ of Chicago, describes a rare condition of descent of both testicles through the left inguinal canal into the left scrotum. The patient was forty-two years of age, with a history of having had a left inguinal hernia of large size since early childhood. At the time

¹ Surgery, Gynecology, and Obstetrics, February, 1907.

of the operation the tumor measured 8 inches from the pubic spine to the bottom of the scrotum. The hernia had been irreducible for two months and was about the size of a child's head.

Operation was performed on January 7, 1904. In addition to adherent loops of intestine there was found in the hernial sac a structure closely resembling a uterus with the tubes and ovaries attached. On closer examination, the central body, resembling the uterus, was found to consist of a fusion of the epididymis of the two testicles. The testicles themselves were not adherent, and were enclosed in a common tunica vaginalis. "The vasa deferentia could be traced separately from the globus minor upward behind the fused epididymi to a short distance above the globus major, when they approached each other, and apparently became fused into one cord close to the internal ring. There were two spermatic arteries and two sets of veins which, together with the

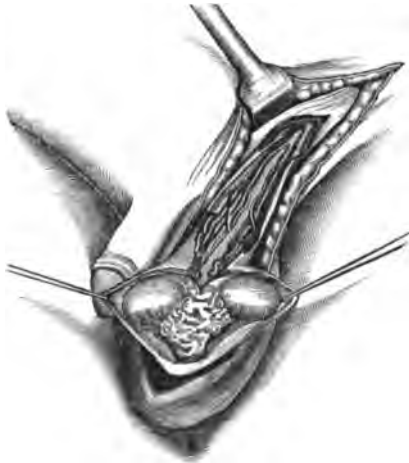


FIG. 11

large vasa deferentia and unusual amount of fatty tissue, greatly increased the size of the cord." The testicles were of equal size, but smaller than normal. The vasa deferentia were distinct and of large size until the upper part of the inguinal canal was reached, where they became closely bound together in one large-sized cord.

As to the cause of this abnormal condition it is to be explained by anomalies of growth in early fetal life, the Wolffian tracts of the two sides in their lower portions becoming united, while the portion toward the testicle remains free. These changes probably take place before the beginning of the descent of the testicles. Halstead, in a careful search of the literature, was able to find only 2 similar cases, the first reported by Lenhossek,¹ in 1845; the second that of Jordan.² Lenhos-

¹ Anatomischer Anzeiger.

² Deutsch med. Wochenschr., 1895, xxi, 525.

sek's case was a man thirty-five years of age, Jordan's a boy of eight years.

Torsion of the Omentum. In addition to 29 cases of torsion of the omentum collected by Roche,¹ Pretsch² has recently published 15 cases found in the literature, including 1 operated upon at the Marburg Clinic (Küttner). In 42 of these 44 cases the condition was complicated with a hernia, 41 inguinal and 1 ventral hernia.

With regard to the age of the patients, it appears that two-thirds were between thirty and fifty years; the youngest was seventeen years, the two oldest seventy-six and seventy-nine years old, respectively.

The condition is much more frequently found in men than in women, 74 per cent. of the cases reported being men, 26 per cent. women.

As regards the diagnosis, the clinical picture is not always sufficiently characteristic to make the diagnosis easy. Among the conditions most closely simulating torsion of the omentum are: Incarcerated hernia of the omentum, epityphlitis of the hernial sac, torsion of other intra-peritoneal organs, volvulus, invagination, new formation and stenosis of gut, etc. In none of the cases published was the diagnosis of torsion of the omentum made before operation. Pretsch believes the following points to be of diagnostic value: (1) Determination of a cause of the trouble, from the history; (2) the presence of a hernia, possibly irreducible; (3) the rapid development of a large, hard, freely movable tumor, with numerous tuberosities; (4) the finding of a cord-like connection between a hernia and abdominal tumor.

With regard to treatment, Pretsch states nothing but radical operation is indicated. Attempts at taxis are to be avoided under all circumstances.

The prognosis depends principally upon timely surgical intervention. 6 deaths (14 per cent.) are recorded in the reported series. Of these 1 patient died before operation, of exhaustion; in the second fatal case the operation was evidently performed too late and the omentum had already become gangrenous; in 2 other cases death was evidently due to other diseases complicating the torsion of omentum; only 2 deaths can be said to be directly due to the operation.

In the remaining cases a cure was effected; in most instances the wound healed by primary union. In a few cases no definite statements are made.

Ureteral Hernia. Carli,³ of Pavia, Italy, has made a very careful study of ureteral hernia, a variety which, he believes, must occur much more frequently than the few cases reported would indicate. He has been able to collect but 9 cases from the literature, to which he adds 2 observed at Professor Muscatello's Clinic.

¹ Des torsions de l'épiploon, Thèse, Paris, 1905.

² Beitr. z. klin. Chir., 1906, Band xlvi, Nr. 1.

³ Arch. f. klin. Chir., 1905, vol. lxxvi, Nr. 4.

Carli divides these hernias into two groups, viz:

1. Simple ureteral hernia, meaning those in which the ureter only has extravasated.

2. Ureteral hernia combined with rupture of the bladder, being the form in which both ureter and bladder have prolapsed.

The former represents the true typical form, the latter an accessory form of vesical hernia.

The above classification holds good for the inguinal as well as the crural variety.

Of the 11 cases reported, 6 belong to the inguinal, 5 to the crural variety. Of the former only 2 were simple and external, the others being combined with a vesical and internal or direct hernia. All occurred on the right side.

Of the 5 crural hernias, all were simple; 2 were observed on the right, 3 on the left side.

The ages of the patients ranged between nine and sixty-three years, the majority occurring during the fourth, fifth, and sixth decade of life.

All the ureteral hernias of the crural variety occurred in women; those of the inguinal form, in men.

With reference to the hypothesis set up by Reichel,¹ "if during intra-uterine life the testicle during the period of descent had formed adhesions with the ureter, in consequence of its relation to same, it might evidently carry along the ureter into the vaginoperitoneal canal," Carli states, as Reichel himself has admitted, that such congenital origin of the external inguino-ureteral hernia has not as yet been proven, all cases so far recorded having apparently been caused by sliding.

Speaking of the pathological anatomy of ureteral hernia, Carli states that the ruptured ureter, especially in the simple form, retains its relation to the peritoneum while in the hernial sac. In nearly all of the cases the ruptured ureter was found normal in appearance.

With regard to the diagnosis, it is stated that in none of the cases was the same made before operation.

Cystic enlargement of the ureter may be a sign of some importance. Reichel believes that hydronephrosis in the presence of a hernia may yet prove of pathognomonic value. The prognosis of ureteral hernia is favorable in the absence of serious changes in the ureter and kidney.

In 9 of the 10 cases operated upon, the ureter remained intact and was replaced. A complete cure was obtained in 8 cases. One death is recorded, but this is said to have been due to the volume of an irreducible inguinal hernia and prolonged operation.

Obturator Hernia. Schwarzschild² reports a case of osteoplastic closure of an obturator hernia that had been three times incarcerated in the left foramen obturatorium.

¹ Arch. f. klin. Chir., 1892, Band xlv.

² Of the Civic Hospital, Cologne, Bardenheuer. Deutsche Zeitschr. f. Chir., September, 1904.

The idea of osteoplastic closure of large hernial openings was first successfully carried out by Trendelenburg in 1891.¹ At the same time, but independently from the latter, Kraske reported a series of cases operated upon in this way.

Trendelenburg's method consists in forming out of the pelvis of the patient a periosteal bone flap, the upper part of which is turned into the hernial opening, while its base remains connected with the pelvis. Trendelenburg considers this procedure as suitable for very large crural hernias, while for inguinal hernia he believes it too serious an intervention and not sufficiently safe.

Kraske places much more faith in the procedure and has repeatedly seen the hernial opening to have remained closed for a considerable period after operation. Trendelenburg's cases thus operated upon were reported by Hackenbruch: 3 of 5 cases were successful. Very similar to Trendelenburg's method is that of Körte, who employed it in 4 cases, 2 inguinal and 2 crural hernias, and in all 4 closure of the large hernial opening, which would have been impossible in any other way, was accomplished by this method. Various other methods, principally for crural hernia, have been devised by different authors.

A remarkable circumstance in the case reported by Schwarzschild² was the fact that the very symptoms that furnish the basis for the diagnosis of obturator hernia were absent; there was no bulging of the adductor region and no local tenderness in Scarpa's triangle. For this reason the diagnosis of internal incarceration was made at the time of the first operation, and even at the last operation it was only thought probable that an obturator hernia might be found. The case evidently must be classed as one of the "latent form" of obturator hernia described by Rose.³ At the time of the third laparotomy, it was decided to make an attempt to close the obturator canal. For this purpose a periosteal bone flap about 4 cm. in width was chiselled out of the inner side of the symphysis, mainly from the descending ramus of the left pubic bone, and placed upon the hernial opening. Deep catgut sutures were used to unite the plate and muscular structures, and the peritoneum was closed over the same. The operation was completed by a layer suture of fascia, muscle, and skin. The patient made an uninterrupted recovery and was out of bed at the end of six weeks.

Schwarzschild strongly recommends laparotomy in all cases of diagnosed obturator hernia, unless absolutely prohibited by the patient's condition. While according to English, who, the same as König, advanced the femoral incision in these cases, all of the 3 laparotomy cases he found recorded died, Schwarzschild reports 9 successful cases in 21 laparotomies done for obturator hernia, by various operators, being

¹ Verhandl. d. Deutschen Gesellschaft f. Chir., 1893.

² Loc. cit.

³ Deutsche Zeitschr. f. Chir., Band xxxv.

42.85 per cent. of successes. These figures, he thinks, compare favorably with the results obtained by herniotomy; besides, laparotomy may at times become necessary after herniotomy, since obturator hernias are particularly prone to become gangrenous, owing to the tenseness of the constricting ring. Resection of a loop of intestine after herniotomy is also extremely difficult, if not impossible, as the wound is very deep and the canal exceedingly narrow.

Schwarzschild further points out the comparative frequency of relapse in this class of hernias and considers it advisable to immediately add a radical operation after loosening the incarceration. This, he states, can certainly be done with greater ease and exactness after laparotomy than after herniotomy.

Congenital Lumbar Hernia. One of the exceedingly rare forms of hernia is congenital lumbar hernia, or *hernia at the triangle of Petit*. A case of this kind has recently been reported by Dowd.¹ The value of the report is greatly enhanced by some excellent illustrations. Dowd's case occurred in a child, three and one-half years of age, who had been treated by the family physician since the age of three months by means of an elastic belt. It was clearly shown that the hernial sac protruded through the triangle of Petit, which was much enlarged. The sac was distinct, but had no narrow neck and contained the vermiform appendix, which was removed. The defect was closed by means of turning up an aponeurotic flap from below, the flap being made of the fascia lata and the aponeurotic tissue about the insertion of the gluteus maximus and medius, having the attachment at the crest of the ilium as a hinge. Although the wound suppurated, the result was good and the lumbar wall remained firm eight months afterward.

Baracz,² in an article upon this subject, testifies to the rarity of the condition, stating that only 3 cases are known where the place of exit was verified by autopsy. He collected 68 cases, including the congenital, traumatic, and spontaneous varieties, as well as those following cold abscess.

Only 2 cases have been observed at the Hospital for Ruptured and Crippled, 1 of which was operated upon by Dr. Bull and presented by myself before the New York Surgical Society in 1901. The patient made a good recovery and was well when last traced, three years after operation.

Hernia into the Ileocolic Fossa, another rare variety of hernia, has recently been described by Secord,³ of Brantford, Ontario. In the Arris and Gale lectures for 1899 Moynihan stated that there was no such cases on record.

Secord, who reports 1 case, has been unable to find any reported in

¹ Annals of Surgery, February, 1907.

² Arch. f. klin. Chir., 1902, Band lxxviii.

³ Annals of Surgery, November, 1906.

the literature. He states that his case is one of "frank, distinct, and undoubted hernia of the cecum, appendix, and about four inches each of the terminal ileum and ascending colon, into the ileocolic fossa, with strangulation and obstruction caused by the anterior vascular fold; laparotomy being performed, the obstruction being relieved, and recovery finally ensuing." The patient was a male, forty years of age. Operation was done October 7, 1905. He has remained entirely well up to the time of the report.

Paraduodenal Hernia. Vautrin¹ discusses very thoroughly the subject of paraduodenal hernia, otherwise known as *hernia retroperitonealis* or *hernia Treitz*. Prior to the publication of Treitz's paper in 1857, very little attention had been given to this variety of hernia.

Jonnesco, in 1890, in an important communication on hernia retroperitonealis, reports a series of 56 cases collected up to that date. He divides these hernias into left and right duodenal hernias, the left being more common than the right.

According to Treitz, these hernias are always acquired; they are caused by violent effort, blows, shock, or concussion. Some of the predisposing causes are: the existence of a large or deep fossa, elasticity of the retroperitoneal cellular tissue, and great emaciation of the subject.

Contrary to Treitz, Landzert believes that paraduodenal hernias are always congenital. He states that the clinical picture of the condition is by no means characteristic. In the early stages there are no special phenomena worthy of note; later on, when there is more or less occlusion present, digestive troubles—constipation, pain after eating, epigastric cramps, and eructations—are observed and sometimes the stomach becomes dilated. Occasionally there is biliary vomiting, at variable times after eating. As these symptoms increase, there will usually be found a tumor above the umbilicus. In some cases there are symptoms of slow strangulation preceded by separate crises, or by single and prolonged crises. Acute strangulation is rare in paraduodenal hernia. Jonnesco reports 7 cases of acute strangulation of the terminal portion of the ileum, in all of which a paraduodenal sac was found on the left side. Narath, in 1903, was able to find in the medical literature but 8 cases of duodenal hernia treated by operation. Vautrin has collected 14, the majority of which were on the right side.

The operative mortality of this variety of hernia is very large, only 4 cures having been reported.

Intestinal Occlusion or Hernia Through the Foramen of Winslow. The most exhaustive study with which I am familiar, of hernia through the foramen of Winslow, has recently been published by Jeanbrau and Riche.² The rarity of this variety of occlusion justifies the scant attention the subject has received thus far.

¹ Revue de chir., January, 1907, No. 1, p. 46.

² Ibid., 1906, Nos. 4 and 5.

The first case of this kind was published by Blandin in 1823, and found at autopsy. Rokitsky reported a second case in 1842, Treitz a third in 1857, Wilson Moir another in 1867, and Majoli 1 in 1884.

Up to the time of writing, including Jeanbrau and Riche's present case, 20 cases have been recorded.

As regards the sex, it is stated that in 16 cases in which it is known, 13 were men, only 3 women. The youngest case was eight years of age, the oldest seventy-seven years.

In explanation of the mechanical processes instrumental in producing intestinal occlusion through the foramen of Winslow, Jeanbrau and Riche offer the following:

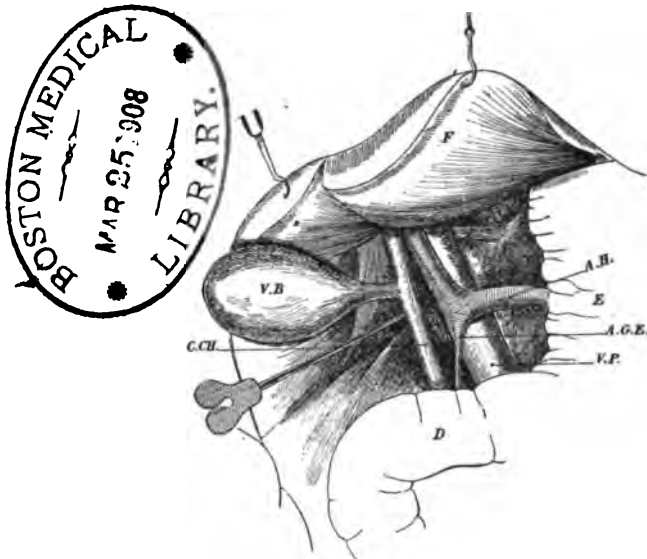


FIG. 12.—Foramen of Winslow.

As a result of some violent effort, the small or large intestine is pushed toward the foramen of Winslow, into which it then may penetrate at a given moment, often very soon causing strangulation. The cases of occlusion in the transverse colon are easily explained by the rather extensive movements the same undergoes, especially in its left portion. In the very rare cases in which the cecum and ascending colon have been found in the retroperitoneal cavity there existed an arrest of development of the colic peritoneum which continued in the shape of a long fold, giving great mobility to the colon.

In the more common cases where the occlusion occurs in the small intestine without having shown an arrest of development of the colic peritoneum, this is the displacement or disappearance of the epiploic plane which permits access of the left intestine to the region of the hiatus. Finally, the penetration of the intestine in the posterior cavity of the epiploon is made easy by the large dimensions of the hiatus,

resulting in an arrest, very localized and limited, to the right sheath of the primary mesoduodenum. In all of these cases the role of the abdominal wall is important.



FIG. 13.—Hernia into the foramen of Winslow.

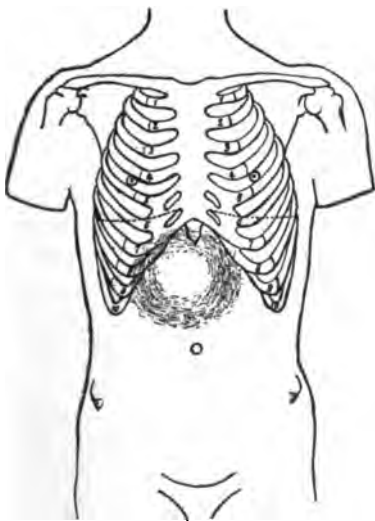


FIG. 14

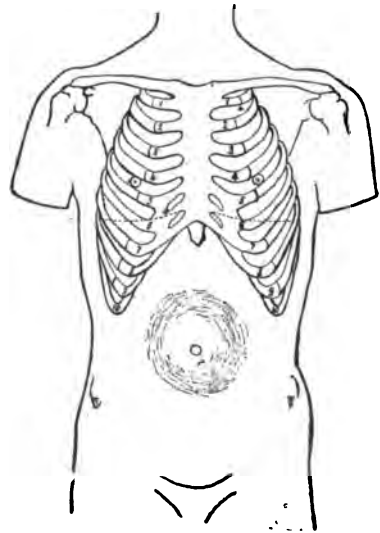


FIG. 15

Showing areas of tumefaction.

As regard physical signs, in 9 out of 12 cases there was an epigastric or periumbilical tumefaction. (See Figs. 12 to 18.)

Diagnosis. In the 18 cases which Jeanbrau and Riche collected the exact clinical diagnosis was never made. Internal strangulation was the nearest that any of the observers came to the real diagnosis.



FIG. 16

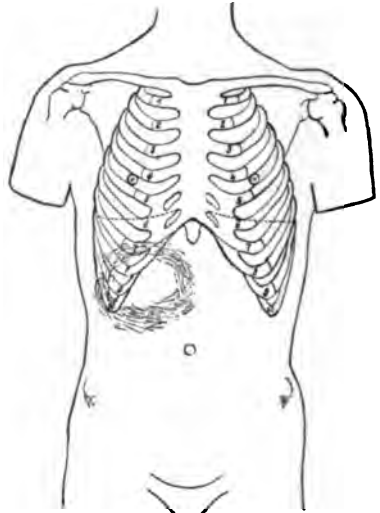


FIG. 17

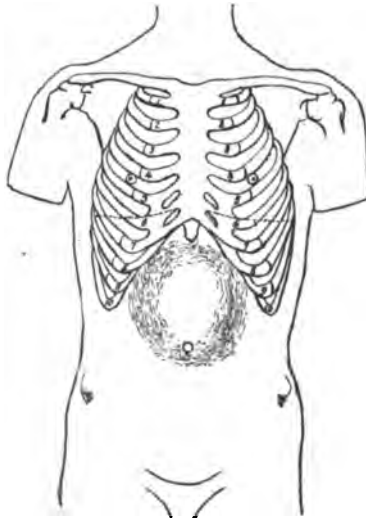


FIG. 18

In 13 cases in which strangulation was especially noted a constriction of the borders of the foramen of Winslow was observed eleven times, six times the small and five times the large intestine.

Treatment. In 11 of the 18 cases collected, laparotomy was performed with 4 cures. Jeanbrau and Riche believe the only two contra-

indications to laparotomy to be insufficient knowledge on the part of the surgeon to perform such a difficult operation, and, second, weak condition of the patient.

In regard to the technique of the operation, they believe enterotomy should be performed in order to facilitate proper exploration. An attempt should be made, first, to reduce the hernia by simple traction; second, in the event of the failure of reduction, the enlargement of the foramen of Winslow should be undertaken. Previous writers have believed it impossible to do this, but Jeanbrau and Riche, in view of their experiments upon the cadaver, are sure it can be done with safety, if carried out in the way described by them.

They state that the procedure which they propose is in reality but the technique employed by Wiart for exposure of the choleduct. That which makes the freeing possible is the existence between the vena cava and duodenum of a flap of loose, cellular tissue, which permits the incising of the peritoneum which forms the posterior lamina of the gastrohepatic omentum; the finger is then passed into the opening, enlarging it.

While this procedure may be easy on the cadaver, Moynihan believes it quite impossible on the living body with the opening already filled with a loop of distended gut.

Some Erroneous Statements Corrected. While discussions of priority in regard to various methods of operation usually are unsatisfactory and unprofitable, questions of accuracy of statement are an entirely different matter. Partly on my own account and partly on behalf of *PROGRESSIVE MEDICINE*, the high reputation of which necessarily depends upon the accuracy of its collaborators, and which has recently been called into question, as far as my own statements are concerned, I am forced to reply to some of the reflections made by Ferguson in his recent work on *Modern Operations for Hernia*, 1907. On page 200 of the same he states, "It is surprising with what facility some surgeons, from a lack of due consideration of the principles involved, make unsupportable statements regarding operative procedures," and proceeds to quote from my article in *PROGRESSIVE MEDICINE*, June, 1905, p. 25:

"In 125 cases the cord was not transplanted, but brought out at the lower angle of the wound, and the *external* oblique being sutured to Poupart's ligament—exactly the same as in inguinal hernia in the female. This method is known in Germany as Wölfler's method without transplantation of the rectus muscle. In this country it is frequently known as Ferguson's method. Wölfler's cases were not reported until 1895, Ferguson's in 1899." The next two lines which Ferguson fails to quote are as follows: "Yet the first cases in which one of the writers (Bull and Coley) employed this method at the Hospital for Ruptured and Crippled occurred in 1892, and were reported in the *Annals of Surgery* in 1895."

There is one typographical error in the quotation, "external" being

used where internal was intended. The quotation is simply a review of the "Results of 1500 Operations for the Radical Cure of Hernia in Children," etc. (Bull and Coley, *Medical Record*, March, 1905), and reference to the original will show that *internal* oblique was used.

This method of operation, as far as one can judge, is identical with that described by Dr. Ferguson as original, and was first performed by Dr. Bull and myself at the Hospital for Ruptured and Crippled in 1892. In the *Annals of Surgery*, April, 1895, I described this method and reported cases operated upon by this method well for three years. I further stated: "Whether the transplanting of the cord is to be regarded as essential to the highest degree of success in hernia operations it is hardly possible to state positively; it may be that the high ligation of the sac and the perfect closure of the canal made possible by slitting up the aponeurosis has quite as much to do with the good results as the transplanting the cord."

"Transplantation of the cord, the distinctive feature of both the Bassini and Halsted operations, is not admitted by all surgeons as essential to the perfect operation for radical cure. During the past four years Dr. Bull and I have been operating upon a series of cases in the same way as *Bassini's method*, with the exception of transplanting the cord."—*Annals of Surgery*, March, 1897, "Radical Cure of Hernia" (Coley).

"The method we have employed (in inguinal hernia in the female 100 cases) has been practically Bassini's method in the male, with the single step of transplanting the cord omitted."—*Annals of Surgery*, November, 1898 (Bull and Coley).

"The method which we have employed in a considerable number of cases, and which we have designated 'Suture of the Canal, without Transplantation of the Cord,' the *remaining steps being identical with Bassini's*, has, we believe, much to commend it, though as yet our cases are too few in number to estimate its comparative value."—(*International Text-book of Surgery*, Warren and Gould, first edition, 1900, written in 1899, p. 497 (Bull and Coley).

These quotations are, I think, sufficient answer to the statement that Ferguson has "failed to find a corroboration of Coley's unqualified statement."

Ferguson states (page 280) that the operation was devised by him in January and presented to the profession in May, 1900, and published in the *Journal of the American Medical Association*, July 1, 1900, eight years after Dr. Bull and myself had performed the operation, and from two to five years after we had repeatedly described and published it in the leading surgical journal of this country. In the opinion of Dr. Bull and myself the method was too slight a modification of Bassini's to justify us in claiming it as original. Yet this does not prevent us from recording our protest against Ferguson's remarkable claim that he was the author of the method.

The statement in *PROGRESSIVE MEDICINE*, June, 1905, that Wölfler was doing practically the same operation in Germany from 1895 to 1902 does not rest upon any assumption on my part, but upon an exhaustive article by Hilgenreiner, who reported Wölfler's own results at the Prague Clinic (*Beitr. z. klin. Chir.*, 1903-04, p. 373). Hilgenreiner states that "although of 209 previously published cases the cord was transplanted only in 6 cases, the step being promptly discarded as being unpractical and superfluous, transplantation of the cord is always described as the essential feature of Wölfler's method, while in reality it is about the only distinguishing feature of Wölfler's from Bassini's operation, all other steps being practically the same."

The fact that Ferguson fails to find any mention of Wölfler's operation in vol. iv of the *System of Practical Surgery*, by E. v. Bergmann, and in the *Reference Handbook of Medical Sciences*, is of no value compared with the evidence from original sources, namely, Wölfler's own paper, or papers of his assistants reporting the results at the Prague Clinic.

As early as 1898 (*Arch. f. klin. Chir.*) Slajmer published the results of 150 cases operated upon by Wölfler's method, with illustrations showing the entire technique of the operation. While the transplantation of the rectus muscle was an important feature brought out in the original article, a study of the cases published in detail shows that this step was by no means always employed. In Hilgenreiner's later report of Wölfler's cases, a large number were operated upon without this step. In other words, suture of the internal oblique to Poupart's ligament, without the transplantation of the cord.

SURGERY OF THE ABDOMEN, EXCLUSIVE OF HERNIA.

BY EDWARD MILTON FOOTE, M.D.

THE ABDOMEN IN GENERAL.

Abdominal Hemorrhage. EARLY DIAGNOSIS. Hollenbeck¹ suggests the use of a trocar and cannula as a means of early diagnosis in suspected abdominal hemorrhage. He recommends a cannula with lateral openings. This does away with one objection which has been made to the use of a cannula for this purpose, *i.e.*, that the end of the tube might be occluded by a loop of intestine. Another objection is the possibility that the trocar might penetrate the bowel. A number of experiments upon dogs seem to show that this fear is groundless. It is, however, doubtful whether this testimony will overcome the prejudice that surgeons feel against abdominal puncture after injuries.

TREATMENT OF INTRAPERITONEAL HEMORRHAGE. Jampolis² recommends the infusion of warm, normal saline solution into the abdominal cavity in every case of peritoneal hemorrhage not associated with infection, as it relieves the shock and is an aid to subsequent operation in case that should be necessary. In some cases it would apparently cure the patient without operation. He advises the injection of 500 to 1000 c.c. He draws these conclusions from experiments upon fifteen dogs.

Vaughan, in the discussion of this paper, disapproved of the suggestion, since in case of rupture of the intestine the effect of the saline would be to spread the infection.

Value of the Blood Count in Sepsis. Counting the blood in about 2000 surgical cases has strengthened the belief of Sondern³ in the diagnostic value of this procedure. In sepsis there is an increase in the relative proportion of polynuclear cells, on differential count, above 85 per cent., and the higher the proportion the more virulent is the pyogenic process. This is associated with more or less leukocytosis, and the higher the leukocytosis the stronger the power in the body to resist the infection. A slight polynuclear increase with marked leukocytosis indicates slight infection and well-developed resistance. Marked polynuclear increase and pronounced leukocytosis indicate a severe

¹ Journal of the American Medical Association, 1906, vol. xlvii, p. 1277.

² Loc. cit.

³ New York Medical Journal, 1906, vol. lxxxiii, p. 1245.

infection and good resistance. A pronounced polynuclear increase and little or no leukocytosis indicate a severe infection and little or no body resistance. A decrease in both polynuclear percentage and in the leukocytosis denotes improvement. There is one exception to these rules worth noting: When pus is confined by a dense pyogenic or fibrous membrane, in other words, when no absorption of toxin occurs, there is no leukocytosis and no polynuclear increase. Polynuclear increase and leukocytosis occur also in pneumonia, erysipelas, scarlet fever, and at times in malignant disease.

"Idiopathic" Acute Peritonitis. The term idiopathic is in such disrepute that Oppenheimer¹ apologizes for using it to describe two cases of acute peritonitis in which the most careful search failed to reveal the starting point of the abdominal infection. One patient was a man aged fifty-one years, upon whom there had been performed a resection of the pylorus and a gastro-enterostomy for carcinoma. The external wound healed promptly, and the man's recovery was in every way satisfactory. More than five weeks later he complained of vague pain in the left shoulder, followed by pain in the left abdomen, and chills and fever. Six days later the abdomen was opened, but the suppurative peritonitis then existing had so weakened the patient that he died before the cause of the inflammation could be ascertained. Nor was it ever ascertained. The chief collection of pus was between the stomach and spleen. The wall of the stomach itself was edematous, but no perforation could be found. The anastomosis between stomach and jejunum was perfectly healed and the sutures of the duodenum and stomach were also tight.

A second case was no less puzzling. The patient was a girl aged five and one-half months. Erysipelas beginning in the perineal region spread in six days so extensively over the abdomen, chest, and thighs that she died. There was a half-pint of pus in the left side of the abdomen near the spleen. This organ alone of those of the abdominal cavity had a little fibrin over its peritoneal surface. In this fibrin, as well as in the spleen itself and in the kidneys and bloodvessels, were found streptococci.

Martin² gives the history of three cases which show that diffuse septic peritonitis may arise without any demonstrable lesion. A girl, aged nine years, felt miserable for two weeks. She was then suddenly seized with severe epigastric pain and vomiting, followed by diarrhea. The following day she presented a typical picture of peritonitis, with a leukocyte count of over 59,000. The abdomen was opened and was found full of seropus. Cultures showed a pure streptococcus infection. Three days later a searching postmortem examination revealed no cause for the peritonitis.

¹ Deutsche Zeitschrift f. Chirurgie, 1906, vol. lxxxiii, p. 456.

² Annals of Surgery, 1906, vol. xlv, p. 917.

The second case was that of a baby aged ten months, whose bowels became very constipated after a slight injury to the abdomen. There was fever, followed by distressing vomiting and other symptoms of peritonitis. The child died without operation, and although the abdomen was full of extremely foul, milky pus, no visceral lesion could be detected.

The third case was similar. Here again the postmortem examination of the stomach and intestines failed to show any perforative lesion.

Martin believes that the proper procedure in such cases is an incision in the right lower abdomen, thus permitting a rapid examination of the organs from which most abdominal infections arise. If no causal lesion is found, and there is no evidence of gastro-intestinal perforation, further exploration should be omitted.

PNEUMOCOCCIC PERITONITIS IN CHILDREN. Annand and Bowen,¹ from a study of 91 cases of this disease, conclude: (1) That it is comparatively rare, but that many cases have been overlooked. (2) In about one-third of the cases it is secondary to some distant pneumococcic focus, most often in the lung or pleura, sometimes in the middle ear. (3) In the remaining two-thirds of the cases infection probably is from the bowel. (4) In one-half of the cases the pus is encysted; diagnosis is easy; prognosis is good; and the treatment indicated is laparotomy and drainage. (5) In the other half the peritonitis is diffuse; diagnosis is difficult; prognosis is bad; the treatment indicated is laparotomy. (6) The pathological appearances are characteristic. There is a formation of fibrin and pus, the latter being odorless if the pneumococcus exists in pure culture.

DIFFUSE SUPPURATIVE PERITONITIS. Hotchkiss² says that the patient's safety in peritonitis depends only in part on the integrity of the endothelium. In most cases there is a protective fibrinous deposit which limits absorption into the peritoneal bloodvessels. The absence of this deposit noted in bad cases of streptococcus infection is associated with a fearful mortality, as is well known. Hotchkiss gives his treatment and the results of it in diffuse purulent peritonitis, following appendicitis, including under this heading all those cases in which the limits of the pus are extensive, but not easily definable, and which are without encapsulation. From 1895 to 1899 he operated on 12 such cases, with 11 deaths. From 1899 to 1903 he had 15 such cases, with no mortality. Since then he has had 28 cases, with 5 deaths; 3 of these patients were practically moribund, and 1 probably had pneumonia at the time of operation. The fifth was the subject of an extensive pulmonary tuberculosis. The treatment followed before 1899 was free opening, more or less evisceration, saline irrigation, and drainage. In the second series of cases the appendix was rapidly removed through

¹ *Lancet*, 1906, vol. i, p. 1591

² *Annals of Surgery*, 1906, vol. xliii, p. 197

the gridiron incision; there was no evisceration, the pelvis and lower abdomen were irrigated with hot saline, and small cigarette drains were employed. In the third series of cases the technique has been similar, except that in many cases no drainage has been employed other than a small drain in the external wound. An effort has also been made to shorten the period of operation. Before the patient has left the operating table his stomach has been washed out, and an ounce or two of the saturated solution of Epsom salts has been left in the stomach. If vomiting occurs, the stomach is again washed out and the lower bowel irrigated every six or eight hours for two days with saline solution. Morphine is avoided, if possible. The Fowler position is recommended simply because it facilitates breathing. If there is an area of local necrosis, it should be isolated and drained.

Torek¹ has treated 21 patients with diffuse suppurative peritonitis following appendicitis, with only 3 deaths. His technique is as follows: An incision in the median line, or slightly to the right of it, so that it shall be in about the centre of the inflamed area. The incision in most cases reaches from the pubes to well above the umbilicus. Pus flows out or is dipped out, peritoneal wiping being avoided. The appendix is removed. The peritoneal cavity is flushed with large quantities of saline solution poured from bottles or pitchers. He regards lavage, by means of a long tube introduced through a comparatively small opening in the region of the appendix, as entirely inadequate. The abdomen is closed without drainage.

If the peritoneum has not been grossly injured by the suppuration, and if the pus has been thoroughly removed, the infectious material which remains will be so diluted that the peritoneum can take care of it. If large portions of the peritoneum show gross changes, recovery is less likely. Torek elevates the foot of the bed rather than the head. He insists on the importance of hypodermic stimulation, using strychnine, digitalis, and camphor, and occasionally caffeine and nitroglycerin. He gives enough morphine to keep his patient comfortable, and considers cathartics and enemas, and other measures which may excite the peristalsis in the first few days, to be exceedingly dangerous.

"Toilet of the Peritoneum." Ward² objects to elaborate peritoneal cleansing, which he considers useless if free drainage is afforded in perforative peritonitis. He once operated upon a young woman supposed to have a perforated gastric ulcer. She was so nearly moribund that there was only time for a quick incision above the symphysis pubis, from which a great quantity of mutton broth poured out. A tube was inserted and the patient placed in a half-sitting posture; recovery followed. Ward advises intravenous infusion, half-pints of saline solution

¹ Medical Record, 1906, vol. lxx, p. 849.

² Lancet, 1906, vol. ii, p. 19.

every four hours, strychnine, and, if distention exists, turpentine enemas, but no peritoneal lavage. He gives plenty of water or other bland fluid by the mouth after gastro-enterostomy as well as after other operations.

TUBERCULOUS PERITONITIS. Pitfield¹ suggests that the improvement which follows a simple exploration in some cases of tuberculous peritonitis may be due to the access of some of the patient's blood to the serous cavity. The blood, no doubt, in all such cases contains some immune serum and the serous fluid contains some complement, perhaps.

Immune serum plus complement, plus tubercle bacilli, may effect a bacteriolysis of the latter, as in the case of cholera bacilli, when some serum from an animal immunized against cholera bacilli and the natural serum (complement) in the peritoneal cavity, if mixed either in the peritoneal cavity or in a test tube, effect a solution of the bacilli. Members of the mycobacteria group (tubercle bacilli) do not dissolve ordinarily in the presence of either immune serum or some complement serum or both, but they may do so in the body. Or the admixture of the immune serum with the peritoneal contents may effect a destruction of the bacilli by reason of the opsonins that it may contain, or in some other way stimulate phagocytosis.

At any rate, it would do the patient very little harm to allow some of his own blood to remain behind in the peritoneum after a section for tuberculosis. The removal of an existing focus should, of course, be attended to. As pointed out in the article of last year, this is most often the appendix in men or the Fallopian tube in women.

Glass Tubes for Abdominal Drainage. At the German Congress of Surgery held in April, 1906, Dreesmann² recommended the use of large glass tubes, closed at the end and with small lateral openings for peritoneal drainage. Gauze is placed in the glass tube, but never outside of it, except to control hemorrhage. He has had satisfactory results with these tubes in cases of abdominal abscess and after such operations as cholecystectomy, choledochotomy, resection of the stomach, and of the colon. The glass tube is kept in place by suture to the abdominal wall.

Postoperative Thrombosis. Witzel³ believes that it is possible to reduce the number of cases of postoperative thrombosis by the proper treatment of the patient before and during the operation. He bases his opinion upon the fact that every wound is accompanied by a certain amount of thrombosis which does not become extensive because of the activity of the circulation of the blood. Prophylaxis consists therefore in an improvement of the general condition of the patient before operation, and especially in regular breathing exercises. During the operation he lays stress upon the avoidance of hemorrhage and pro-

¹ Journal of the American Medical Association, 1906, vol. xlvii, p. 1192.

² Zentralblatt f. Chirurgie, 1906, Beilage, p. 85.

³ Deutsche Zeitschrift f. Chirurgie, 1906, vol. lxxxv, p. 228.

tection of the patient from loss of the body heat. As soon as possible after operation, he urges his patients to move about, and, if they cannot get out of bed, to move their arms and legs and continue their breathing exercises. This applies to operations upon the abdomen as well as upon other parts of the body. If thrombosis occurs, the portion of the body affected must, of course, be kept very quiet, but the blood circulation may be even then improved by a continuance of the breathing exercises, and by massage and passive and active motion of the unaffected extremities.

Bristow¹ says that we cannot escape from the conclusion that phlebitis after abdominal operations is a localized sepsis of a mild type, the origin of which has passed through the circulation to become arrested in the venous system, where the flow is least active. This explains its frequency in the veins of the lower extremity. In appendicitis, for instance, there is almost always a phlebitis of the veins of the meso-appendix, which might readily furnish a mycotic thrombus of microscopic size; and this lodging somewhere in the slow current of the veins of the extremities might be sufficient to set up an inflammatory process. In the case of pelvic operations for non-inflammatory conditions, ligated veins, frequently of large size, are in contact with bowel. Such a vein, having lowered resistance, might receive an infection through the coats of the bowel without any actual solution of continuity.

Bristow mentions an unusual case of postoperative infection, following a perfectly aseptic healing after the removal of a moderately inflamed appendix. About ten days after operation the patient began to have symptoms referable to the right shoulder, and three weeks after operation a deep abscess of the chest wall running in the general direction of the *teres major* muscle was opened. About an ounce of pus escaped. Cultures showed a pure growth of the *Staphylococcus aureus*.

These two views represent the two opinions generally held. Thus Grant² inclines to the view that phlebitis after an aseptic operation is not of septic origin. He says, in the absence of convincing or pathological evidence, and in the best and cleanest days known to surgery, it is not rational to assume an infection that is devoid of satisfactory evidence. He believes that there is a general condition affecting the composition of the blood, that may, and often does, exist before operation, which is an essential factor in the cause of thrombophlebitis in these cases. A careful scrutiny of patients should be made before operation, and an examination of the blood should be made before and after operation. This on a fairly liberal scale, in his opinion, would reveal interesting and useful information, and shed some light on this puzzling subject.

In his article Grant gives a *resume* of opinions held by twenty-three

¹ New York State Journal of Medicine, 1906, vol. vi, p. 390.

² Journal of the American Medical Association, 1907, vol. xlviii, p. 567.

writers upon thrombosis and embolism, and, to show still more clearly the views held in America at the present time, he wrote to about thirty distinguished surgeons and physicians, asking them their opinion as to the chief cause of phlebitis occurring during the second week of an aseptic convalescence following an interval appendectomy. He publishes twenty-one replies; nine of them attribute the thrombosis to infection; the remaining twelve believe the cause to be non-infectious. The action of gravity, of traumatism, of ligatures, and of dorsal decubitus too rigidly enforced, are all suggested as possible causes.

PRE-OPERATIVE THROMBI. Abbott¹ says that the importance of the existence of thrombi in the field of operation has been overlooked. Thrombophlebitis is common in inflamed areas. A vessel in which there is a clot is more likely to become infected during an operation than one whose lumen is open, because if the thrombosed vessel is open it remains open and exposed to germ invasion. The normal vessel bleeds, washes away infected material, and is immediately closed by the surgeon.

Abbott has seen thrombosed veins many times in cases of lacerated perineum; he has seen thrombi in the deep epigastric veins in large appendical abscesses, and has also seen the thoracic veins thrombosed. He believes that many cases of fatal sepsis, pulmonary embolism, and so-called ether pneumonia can be rightly ascribed to the infection of a clotted vein, or its disturbance by rough handling, or both. If a thrombosed vein is seen during operation and the collateral circulation is adequate, the thrombosed veins should be excised or ligated centrally. If the collateral supply is inadequate, the necrosed tissues, with the thrombosed vessels which supply or drain it, should be resected if possible. If the conditions are such that these methods are inapplicable, the vessels should be disturbed as little as possible.

Embolism and Thrombosis of the Mesenteric Vessels. Niederstein² has been able, by means of a series of experiments upon animals, to reproduce the various changes which result from altered circulation in the mesenteric vessels. He finds that:

1. The hemorrhagic infarct may be due to an embolus or thrombus closing the chief arterial or venous supply. The changes are more extensive if the chief vein is closed than they are if the chief artery is closed.
2. The anemic infarct is produced by embolism in the chief artery, with thrombosis at the same time of the vessels which otherwise would afford collateral circulation.
3. Hemorrhagic gangrene occurs most certainly from embolism of the chief vessel above the right colic artery, with simultaneous thrombosis of a part of the venous supply.

¹ *Surgery, Gynecology, and Obstetrics*, 1906, vol. ii, p. 287.

² *Deutsche Zeitschrift f. Chirurgie*, 1906, vol. lxxxv, p. 710

4. Anemic gangrene is due to a complete embolic or thrombotic closure of a limited arterial supply, with simultaneous thrombosis of the corresponding veins: or it may be due to the separation of the mesentery for a considerable distance. In this case the central portion of the gangrene will be anemic, while the marginal portions will be hemorrhagic.

According to Rittershaus,¹ while 100 cases of embolism or thrombosis of the mesenteric vessels have been reported, radical treatment, *i. e.*, resection of the damaged intestine, has only been carried out five times, and only 2 of these 5 patients recovered.

The Omentum and its Functions. Dickinson² has reviewed what twenty-four authors have written about the omentum, and draws the following conclusions:

1. The numerous bloodvessels and lax tissues of the omentum allow of storage of blood when the general arterial tension is high.

2. By venous anastomosis through adhesions local congestion may be relieved.

3. Through its large surface freely exposed to surrounding parts in motion, it becomes a rapid absorber of fluids by the blood stream.

4. By the lymph stream it is a free carrier of white blood corpuscles, encapsulating solid particles.

5. Through its cohesive tendency, apertures in the abdomen into which the omentum has been forced by intra-abdominal pressure become more or less completely closed.

6. Through its readiness to lymph formation and local proliferation, it becomes attached to infected parts, which are walled off, subsequently to be absorbed by phagocytic action. The peritoneal cavity is thereby protected.

7. The majority of the phagocytes extruded into the peritoneum for its protection come through the omentum, largely from the general circulation, but in part from the tissues therein existing; subsequently to be attached to the surface of this tissue, taken into the lymph stream, and subjected to the cytolytic influences existing there.

8. Lack of development of the omentum, or loss through operation, renders one less resistant to peritoneal invasion.

9. Hemolymph glands of the splenic type existing in its base supplement the spleen if the latter be removed or its function interfered with.

SARCOMA OF THE OMENTUM. Cobb³ reports a case of primary sarcoma of the omentum occurring in a woman aged fifty-one years. Distention of the abdomen and obstinate constipation were the chief symptoms. Three weeks after these symptoms became troublesome

¹ Mitteil. Aus den Grenzgebiet. der Med. und Chirurgie, vol. xvi, p. 385.

² Annals of Surgery, 1906, vol. xlv, p. 652.

³ Ibid., p. 16.

she entered the hospital. There were then noted a leukocytosis of 23,000, and small, tarry stools after enemas. No tumor was palpable. The abdomen was found to contain about a quart of sterile, bloody fluid, and the whole omentum was thickened and infiltrated with blood. It was one inch thick, and resembled a red rubber bath sponge. There were numerous white spots suggesting fat necrosis, but the pancreas was apparently normal. As the condition was deemed hopeless the abdomen was closed. The patient died five weeks later. The microscopic diagnosis was large round-cell sarcoma.

Matas removed the entire omentum for myxosarcoma, but within a year the recurrence of the tumor had filled the entire peritoneal cavity.

Primary malignant tumors of the omentum are rare. Since 1870 there have been recorded in the reports of the Massachusetts General Hospital only one other case of primary malignant disease of the omentum, and that a fibrosarcoma. The patient died from infection three days after an exploratory laparotomy. Cobb gives abstracts of a number of other cases from the literature in which an undoubted primary tumor existed. Such a tumor is invariably some form of sarcoma, or possibly an endothelioma.

There is no record of a primary carcinoma, and no reason to suppose such a tumor possible in this situation. The fact that the omental tumor may be a myxosarcoma, or may degenerate, forming cysts containing gelatinous and hemorrhagic material, will account for the false diagnosis of colloid carcinoma sometimes made.

Prominent symptoms in connection with omental tumors are pain, fullness of the abdomen, an indefinite tumor, interference with digestion and defecation and a gradual loss of weight.

Primary sarcoma of the lesser omentum has also been observed. The symptoms are similar. The omentum is also the seat of benign tumors—lipoma, fibroma, hydatid, and dermoid cysts.

USE OF OMENTAL GRAFTS IN THE PERITONEAL CAVITY. Springer¹ in his experiments upon dogs has applied omental grafts to normal and contused intestine, and has seen the grafts heal exactly in the positions where they were placed. In a similar manner he has covered wounds due to gastro-enterostomy and resection of the intestine and liver. He has cut the omentum free from all its attachments and, leaving it in the peritoneal cavity, he has found it to retain its vitality through attachments formed to the abdominal wall. In order to succeed in these experiments, it is necessary to use omentum which is free from fat, as this tissue easily necroses. There are more serious disadvantages to this technique. It often leads to extensive peritoneal adhesions, but it gives no absolute protection against intestinal leakage in case it is employed to reinforce an imperfect suture. These experiments were

¹ Zentralblatt f. Chirurgie, 1906, p. 1298.

made with grafts which were entirely cut loose from the omentum, and were therefore comparable to Thiersch grafts cut from the skin.

Springer's results are not quite so encouraging as those mentioned by Girgolaff,¹ who had less trouble from the formation of adhesions. He drew the conclusion, from experiments on cats, that in all cases the omental grafts applied to sutures and wounds of the liver prevented subsequent hemorrhage and tearing out of the suture. When the grafts were applied to the intestine, they were more likely to produce extensive adhesions.

TUMORS OF THE MESENTERY. Bowers² reviews the literature upon solid tumors of the mesentery, giving a *resume* of 23 reported cases, to which he adds 1 of his own. These statistics show that it is almost impossible to differentiate between solid and cystic tumors previous to operation, and even at operation the fluctuation of the solid tumor led to attempts at aspiration in several cases. An important diagnostic point of the mesenteric tumor is its free mobility. Bower's patient was a girl aged fifteen. When first anesthetized the tumor disappeared and the operation was postponed. It reappeared as soon as consciousness returned, its mobility having allowed it to slip up under the ribs. A few weeks later the tumor was successfully removed. It sprang from the transverse mesocolon, was situated in the lesser omental cavity, and was also attached to the posterior wall of the stomach. It was about the size and shape of a kidney, and histologically was a fibroma. The patient made a good recovery.

RETROPERITONEAL PERIRENAL LIPOMA. Reynolds and Wadsworth³ have made a study of the articles upon retroperitoneal lipomas, by Adami in 1896 and 1900, and by Johnson in 1904. Some fifty of these tumors have been reported. About two-thirds of the patients were operated upon with a mortality of 48 per cent. The three dangers of the operation as deduced from the fatal cases are: accidental injury of the mesenteric vessels, necessitating resection of the bowel; accidental injury of the vena cava or its branches, and death from shock, which must be greatly influenced by slow operating because of the time necessarily spent in the repair of such accidental injuries, all of which would be minimized by a more accurate knowledge of the anatomy of the tumor and by this only.

These dangers can be avoided by following in the dissection the perirenal fascia. This fascia is closed above and externally, but is open below and internally. It contains the kidney and suprarenal capsule, the perirenal fat, and probably a portion of the ureter. If, therefore, the fascia is incised external to the colon, and the dissection is carried out within the fascia, there will be no injury of large bloodvessels.

¹ Loc. cit., p. 1212.

² Annals of Surgery, 1906, vol. xlv, p. 892.

³ Ibid., p. 60.

The outer portion of the lipoma should be removed in lobules in order to make easier the deeper dissection. The mass of fat successfully removed in the case reported upon weighed nearly fifteen pounds. The situation of the tumor is shown in Figs. 19 and 20.

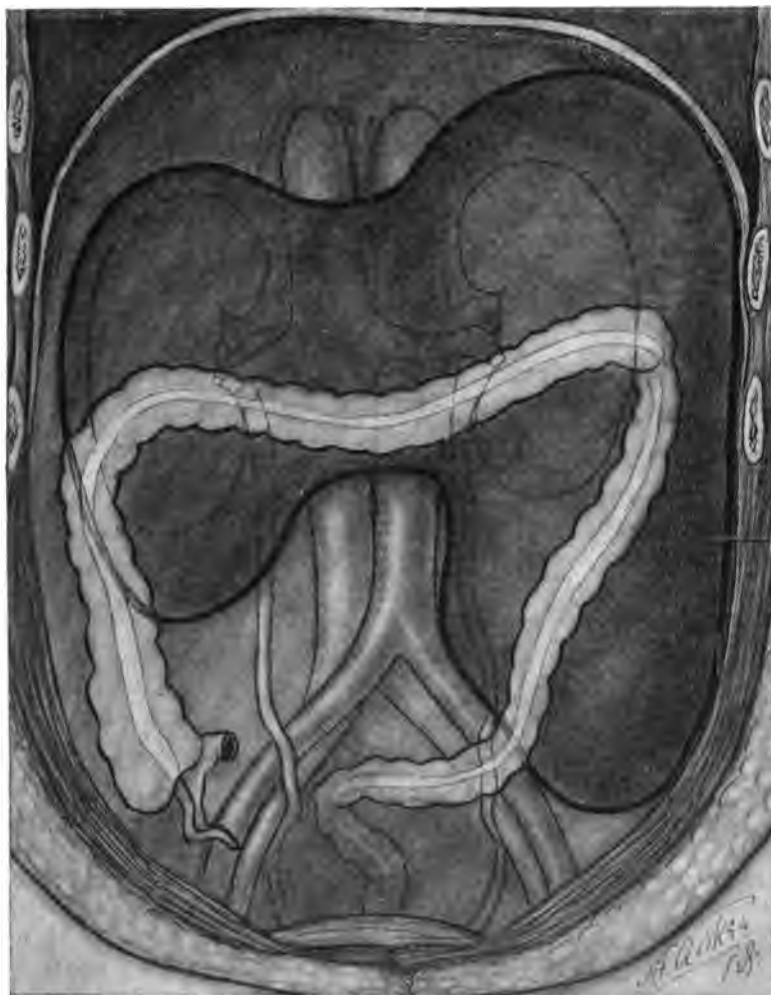


FIG. 19.—Semi-diagrammatic view of the anterior aspect of the tumor, showing the kidneys, ureters, renal vessels, aorta, and vena cavæ behind, and the colon in front of the tumor. The liver, not shown, was crowded upward and to the right; the small intestine, also not shown, lay wholly in the right lower quadrant. *a*, region of comparative safety. (Reynolds and Wadsworth.)

Fistulas and Cysts of the Urachus. In 1895 Vaughan collected reports of 46 complete, 4 blind internal, and 3 blind external fistulas of the urachus. His paper was published in the *Transactions of the*

American Surgical Association for 1905. Since then a number of additional cases have been reported. Binnie¹ saw a woman, aged twenty-nine years, who, all her life, had been subject to pain and tenderness in the hypogastrium. There was a line of induration between the bladder and the umbilicus, and pus escaped from the umbilicus. On examination he found a little mass of granulative tissue at the umbilicus and through this could pass a probe into the bladder. He excised the fistula, which was so closely attached to the peritoneum that the belly had to be opened. The fistula led into a small diverticulum at the fundus of the bladder. Histologically, the walls of the passage consisted of

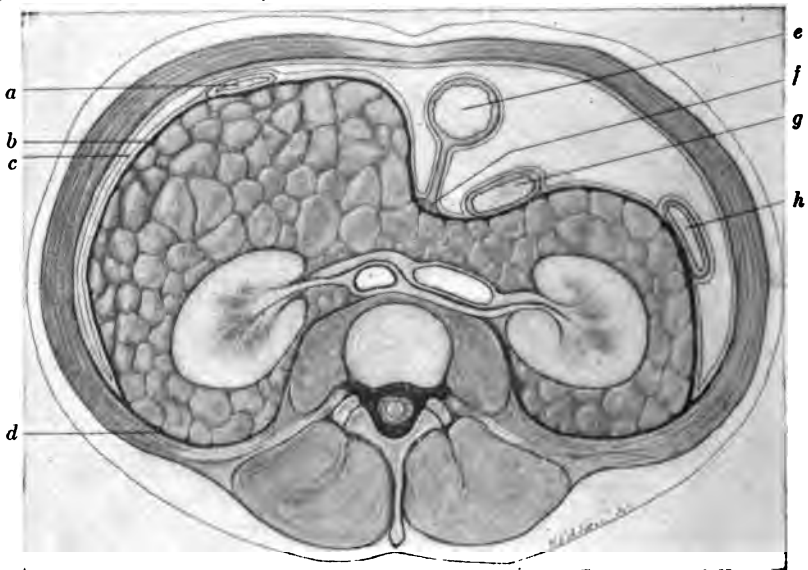


FIG. 20.—Semi-diagrammatic cross-section through the tumor at the level of the renal vessels, seen from above. The perirenal and retrorenal fasciæ unite to form the transversalis fascia. The whole intestinal tract lies in front of the perirenal fascia. *a*, descending colon; *b*, perirenal fascia; *c*, peritoneum; *d*, retrorenal fascia; *e*, small intestine; *f*, superior mesenteric artery; *g*, duodenum; *h*, ascending colon. (Reynolds and Wadsworth.)

very vascular granulation tissue and sclerosed tissue. The lumen was lined by necrotic material. There was no epithelial lining to the sinus.

In other cases the urachus is unable to discharge freely its purulent contents, and an abscess is formed. Binnie reports such a case. A boy of nine years presented a tender, hard tumor, five inches in width, extending in the middle line from the umbilicus to the pubis. Pus escaped from the umbilicus. A probe introduced at the umbilicus

¹ *Journal of the American Medical Association*, 1906, vol. xlvii, p 109

passed toward the fundus of the bladder for a distance of four inches. This sinus was situated between the peritoneum and the muscular wall of the belly. An abscess was present, superficial to the musculature, with an opening through which it communicated with the deep sinus. Free drainage and curettement led to a cure.

These cases led Binnie to examine the condition of the urachus in both adults and fetuses. It will be remembered that about the second month of fetal life the urinary bladder becomes distinct. The remnant of the allantois between the bladder and the umbilicus contracts, and is known as the urachus. Between the fourth and fifth months the urachus loses its lumen and becomes a solid cord. Binnie found that the average adult urachus is 12 cm. long and 1.5 cm. wide. It is usually adherent to the abdominal wall, but in one adult cadaver he found it was not close to the parietes, but lay between loops of small intestine. In every case it was well supplied with bloodvessels. In 7 of the 16 adult cadavers the bladder showed a distinct diverticulum from 1 to 2 cm. deep at the fundus where the urachus is attached. This condition was also found in 6 of the 7 fetuses examined.

Cysts of the urachus are less common than fistulas. Delore and Cotte¹ in writing upon this subject state that small cysts of the urachus are quite common. First noted by Luschka, in 1862, they were minutely described by Wutz, in 1883. In 74 cadavers examined this author found them 24 times. Numerous operators have remarked their presence in the course of laparotomies, and Morestin has recently shown some fine samples to the Anatomical Society of Paris. Large cysts, on the contrary, are so rare that until recently their existence was doubted.

In 1905 Poncet in operating upon a woman aged twenty found a large cyst containing from 8 to 10 liters of a brownish, blood-stained fluid, with much clotted fibrin. The cyst filled the abdominal cavity, but its only attachments were to the umbilicus and to the summit of the bladder. It was therefore completely invested by the peritoneum, except at these points of attachment. From the pedicle of the tumor a hard cord passed up on its anterior surface to the level of the umbilicus, where it lost itself in the tumor and in the abdominal wall. This cord, probably a remnant of the urachus, was, in the middle portion, completely intraperitoneal. There was no epithelium lining the cyst, the walls of which consisted principally of mucoid tissue and non-striated muscle fiber.

Sometimes cases of encysted peritonitis, possibly of tuberculous origin, have wrongly been classed as instances of cyst of the urachus. Binnie cites a case of this character. A woman of twenty-four presented a hard, inflammatory mass, completely filling the pelvis and

¹ *Revue de chirurgie*, 1906, vol. xxxiii, p. 403.

lower segment of the abdomen. A median incision opened an abscess whose walls were at least one inch thick and necrotic. The peritoneum was not distinguished, nor could the uterus or intestine be seen or felt. The abscess cavity on the right side reached nearly to the vagina, and on the left to the brim of the pelvis. No histological examination was made of the abscess wall. Binnie thinks it unjust to classify such a case as a cyst of the urachus, although this has been done by some writers.

Weiser¹ gives a summary of 86 cases of cyst of the urachus, 3 of them being in his own practice, and a number of others being reported for the first time. More than two-thirds of the patients were females, and this proportion is increased if one considers only the adult cases. The treatment followed by most operators has been that first recommended by Tait, and consists in incision and drainage, with the application of iodine or some other irritant to a portion of the lining of the sac, which cannot be removed. In the majority of the cases the sac has been so intimately associated with some of the abdominal organs that removal has not been attempted. In 2 of Weiser's cases the above-mentioned plan of treatment led to a complete cure in two or three months. The third patient was left with a urinary fistula which subsequently closed spontaneously.

UMBILICAL ABSCESS. Atwood² reports the case of a man aged sixty who was struck in the abdomen by the pole of a carriage. After a few minutes of faintness he resumed his work as driver of a fire-engine. His abdomen continued sensitive and became hard, especially in the lower right quadrant. Three months later he was much relieved by a sudden discharge of dark-colored fluid from the umbilicus. Later his pain increased and six months after the original injury he gave up work and called a doctor. There was then a purulent discharge from the umbilicus, increased by pressure on the hard, lower right quadrant of the abdomen. Under ether the umbilicus sinus was exposed for several inches as it passed through the abdominal wall, and two hard, fecal concretions were found and removed. The wound discharged fecal matter for a few days and then healed entirely. In less than two months the man was again at his work. It is remarkable that a man suffering injury of the intestines which led to subsequent necrosis and perforation should continue at work.

Displaced Organs. WHY DOES AN INTRA-ABDOMINAL ORGAN TWIST ON A PEDICLE? Payr³ has found by a number of experiments upon dissected organs that an increase of pressure in the veins may easily produce a twisting of the pedicle. Experiments upon animals have shown him

¹ Annals of Surgery, 1906, vol. xlv, p. 529.

² Boston Medical and Surgical Journal, 1906, vol. clv, p. 36.

³ Deutsche Zeitschrift f. Chirurgie, 1906, vol. lxxxv, p. 392.

that if masses of the omentum are artificially bound together and provided with a pedicle, torsion of this pedicle can be produced by constricting the venous outflow. Under these circumstances the twisting of this pedicle exactly corresponds to the twisting of the omentum which sometimes occurs in man. These experiments seem to prove that variations in the blood pressure are at least one cause of torsion of the pedicle of organs and tumors. Payr speaks of this as hemodynamic torsion.

SPLANCHNOPTOSIS DUE TO ABDOMINAL INCOMPETENCE. Viotor¹ has made a careful study of the development of the abdomen in animals and in man, in prenatal, infantile, and adult life. She has established the proposition that the fundamental cause of splanchnoptosis is abdominal incompetence. In their highest development the abdominal walls not only contain the viscera, but also retain them in position, against gravity and other displacing forces. The abdomen may then be said to be competent. Competence of the abdomen is a developmental factor; it is a stage of evolution to which the human race is at present struggling. Evolution in the direction of abdominal competence proceeds throughout infancy and childhood, and in selected cases it is complete at or before puberty. It is, however, a very unstable possession; in the majority of cases it is never fully attained, and even when it is attained there is a tendency of a reversion to a condition of more or less incompetency. This tendency becomes more marked with the approach of the fourth decade and beyond. This instability of the abdomen and lower extremities exists at the present day in the most primitive as well as the most civilized peoples, and its existence can be traced among all peoples as far back as pictorial history extends.

The distinctive characteristic of the human genus is not the erect trunk, nor even the erection of the trunk on two hinder or lower extremities, but the distinctive human characteristic is the full extension of the lower extremities in the plane of a vertical trunk, the dorsal and ventral surfaces of which tend constantly to approach each other in parallel planes; this extension being accompanied by adduction and forward rotation of the limbs so that the patella and toes point forward. There is a spontaneous tendency of the trunk and extremities toward the developmental deformities; round shoulders; lateral and anteroposterior curvatures of the spine; modifications of weak foot, including pes planus; retracted lower thorax; marked lumbar or lumbothoracic anterior convexity; marked forward rotation of the pelvis; abdominal incompetence, and visceral ptosis—both *en masse* and individual.

Experiments and dissections support the clinical hypothesis that abdominal incompetence is the primary factor in the development not only of splanchnoptosis, but also of the common surgical diseases of the

¹ Boston Medical and Surgical Journal, 1906, vol. clv, p. 139, etc.

upper abdomen; the stomach, duodenum, gall-bladder and bile-ducts, jejunum, pancreas, and kidneys (especially the right) being the most important viscera affected

THE STOMACH.

Gastric Ulcer. Gastric ulcer still holds its place as one of the most interesting topics of abdominal surgery. Although so much has been written upon it in the past few years, the articles upon it in 1906 were both numerous and valuable. A perusal of the replies to the question, "When does a gastric ulcer become surgical?" and to the other question, "What are the late results of treatment, both medical and surgical?" will amply repay either physician or surgeon for the time spent upon it; for men are still wide apart in their answers to these two all-important questions, though the boundary lines of the territory in dispute grow smaller every year.

LOCATION OF GASTRIC ULCERS; "PYLORIC" ULCERS REALLY DUODENAL. Mayo in the Mütter Lecture delivered in Philadelphia December 4, 1906, says that nearly 80 per cent. of all ulcers of the stomach are situated in the grinding pyloric end, the most common variety being the saddle ulcer of the lesser curvature extending flap-like down the anterior and posterior surfaces. The ulcer crater, if one be present, will usually be found upon the posterior wall, or there will be two ulcers facing each other, one anterior and the other posterior, connected superiorly by a bridge of induration. The pylorus is seldom primarily involved in ulceration, since the pyloric canal is normally contracted, and is less exposed to mechanical injury or the presence of an excess of acid secretions. The large majority of so-called pyloric ulcers are in reality duodenal. The duodenal ulcer extends up to the pylorus, or within three-quarters of an inch of it, in 96 per cent. of all the cases. Error in exact localization has led to mistaken identification. As a matter of fact we find at the operating table that no less than 40 per cent. of all gastric and duodenal ulcers are situated in the duodenum.

Trauma plays an important part in the production of ulcer. We have but to remember the frequency of this malady in the grinding pyloric end of the stomach, and to note that duodenal ulcer usually *originates at the point* which receives the impact of the chyme *forcibly ejected* from the pylorus, to appreciate the influence of local injury in gastric disease.

DIAGNOSIS OF GASTRIC ULCER. Barker,¹ says that a diagnosis of gastric ulcer can be made from three symptoms, one of which must always be hyperchlorhydria. He divides the cases into five groups having symptoms as follows:

¹ New York Medical Journal, 1906, vol. lxxxiv, p. 935.

1. Long-continued hyperchlorhydria; pain commencing a half-hour after eating, spasmodic in character, always at the pylorus; and hematemesis.

2. Hyperchlorhydria; pain as in group 1, and primary anemia or chlorosis.

3. Hyperchlorhydria; pain, as in group 1, and continuous vomiting, soon after eating.

4. Hyperchlorhydria; pain radiating from the pylorus, greatly aggravated by deep pressure over the pylorus, and marked anorexia.

5. Hyperchlorhydria; hematemesis, and anemia or chlorosis.

Not only is hyperchlorhydria the most important symptom of gastric ulcer, but the continued, gradual disappearance of the hydrochloric acid until it is below normal indicates the invasion of the ulcer by cancer and should be regarded with the gravest suspicion, even though the patient is otherwise improving. Besides this development of cancer in an active ulcer, it may develop in the scar of a healed ulcer, as is well known.

When does Gastric Ulcer become Surgical? With reference to surgical treatment, Barker takes the position that when a patient has been rationally treated for those conditions which result in gastric ulcer, and the ulcer has formed in spite of such treatment, the patient should be treated surgically. Furthermore, surgical treatment is indicated if an ulcer returns after a medical cure and also in the presence of pyloric stenosis.

If surgical treatment were more perfect than it is now, he would say that all cases of chronic gastric ulcer, or ulcer appearing during or after middle life, should be turned over to the surgeon, but at present he cannot take this position.

Practically, then, ulcers are of two classes. Those that appear in the young and, generally, anemic women, yield to rational medical treatment in about 80 per cent. of the cases. The remaining 20 per cent. of medical failures are turned over to the surgeon as the last resort and he is able to cure about one-half of them.

In the second general class are the cases of gastric ulcer that appear during or after middle life. The internist should try his skill upon these patients, but he will not be able to cure more than 25 per cent. of them. If the patient shows no improvement in thirty days under medical treatment, he will never show it. It is with these patients that surgery has its most brilliant results.

Barker says that gastro-enterostomy as now performed simply drains the stomach at the most dependent point. As an operation it is still on trial. If time demonstrates that cancer does not develop in the scar tissue of healed gastric ulcers after gastro-enterostomy, the position of the operation will be secure. Otherwise, it must yield to some operation which removes the ulcer or its scar.

Boucher¹ says that the following types of gastric ulcer should be considered surgical: (a) cases of relapsing acute hemorrhage; (b) cases with persistent hemorrhage causing anemia; (c) perforation; (d) recurrent ulcer, pure and simple, attended with dyspepsia and starvation; (e) pyloric obstruction; (f) adhesions following ulcer or independent of it; (g) scar contraction of the body of the stomach, giving hour-glass condition; (h) some cases of intractable dyspepsia originating in an ulcer and for which the definite pathology is unknown (Munro).

Lambert² says in skilled hands the mortality of surgery for chronic gastric ulcer is about the same as in medical treatment without surgery. But until the best operation and its technique is more generally agreed on, so that the skill of the few is more widely diffused, and more statistics of end results of operations are published, physicians cannot enthusiastically adopt a surgical point of view. At present we are constrained to believe that all chronic ulcers should first be treated by a most careful and strict regimen. If that fails and the patients cannot live in reasonable comfort or are debarred from the occupations necessary for their livelihood they should then undergo surgical procedures.

Haggard³ finds that in acute ulcer or erosion of young anemic females, manifested by slight bleeding, the well-known dietetic treatment usually yields very satisfactory results. In the indurated or chronic ulcer which is prone to formation in middle life and more frequently in men, medicinal treatment is very disappointing in the permanence of cure. It is in this class of persistent sufferers, where relapses have occurred and where the pain and discomfort interfere with the conduct of life, that operation has been so brilliant. This is especially true in pyloric or duodenal obstruction, even though the ulcer is healed.

Surgery should be kept strictly within the limits of a mechanical appliance. It cannot be asked to act in any miraculous or mysterious way. The indication is solely for better drainage of the stomach, and at a point where the food and acidity will not have to pass over and irritate the ulcer. It is the old principle of rest. The operation which accomplishes this best is posterior gastro-enterostomy without a loop and the incision in the stomach being from right to left.

McCaskey,⁴ in estimating the relative value of medical and surgical treatment of cases of gastric ulcer, says that it is necessary to follow both the cases which are apparently cured and those which are simply improved, for a long period of time. There is no doubt whatever that many cases which are apparently cured by medical treatment will subsequently have a relapse, while presumably a much larger proportion of those cases which are only improved will suffer subsequent exacerba-

¹ New York Medical Journal, 1906, vol. lxxxiv, p. 925.

² Journal of the American Medical Association, 1906, vol. xlvii, p. 845.

³ Ibid., p. 338.

⁴ Medical Record, 1906, vol. lxx, p. 204.

tions more or less serious in character. It remains to be shown that this will not be in a large measure true with reference to the cases treated surgically. There are certain drawbacks to surgical treatment besides the mortality which attends it. Gastro-enterostomy is occasionally followed by an acute perforating jejunal ulcer. The fixation of stomach and intestine must interfere with the motility of both organs, especially if the anastomotic opening is closed, whereas if it remains patent a certain amount of bile and pancreatic juice are regurgitated into the stomach. In view of these facts, every case of gastric ulcer ought to have the benefit of a carefully conducted medical treatment before the question of surgery is raised at all. Secondly, if the patient suffers a recurrence, he should at least have a second chance of medical treatment, until it is shown that the recurrence does not follow surgical treatment. The precise length of time during which medical treatment should be followed in intractable cases before surgical intervention is invoked cannot be decided by any hard and fast rule.

When Not to Operate. Munro¹ has tried every type of operation on about 20 so-called neurotics, who for the most part exhibited visible but insignificant evidences of past lesions. Almost without exception the results of drainage have been disappointing or even fatal. The pathology of these cases is obscure; he thinks some are probably types of hysteria; others are probably not so. His rule now is to abstain from doing anything to modify the drainage of the stomach if, at exploration, no sufficient cause for the symptoms is found, even though there may be healed ulcers.

LATE RESULTS OF TREATMENT FOR GASTRIC ULCER. After Medical Treatment. In preparing this article I have made an especial effort to collect statements of both physicians and surgeons upon the final outcome of their respective methods of treatment; for this is the point on which the decision in favor of surgery or medicine will turn. The risk of a surgical operation for gastric ulcer has been so reduced that it is not much more than the risk of the disease without operation, so that the method of treatment that can show the best results years afterward will win popular favor. In most of the articles upon gastric ulcers there is an unfortunate lack of definite information as to the late results.

Hewes² treated medically 51 patients having simple ulcer of the stomach, the diagnosis having been confirmed in every case by blood in the vomit or stools. One died from hemorrhage while receiving medical treatment and one from a subsequent operation. The outcome in the remaining 49 cases was: Cured for two years or more, 63 per cent.; recurrence of symptoms, 36 per cent.; died, 2 per cent. The percentage of permanent recovery among those patients who followed absolute rules of treatment

¹ Journal of the American Medical Association, 1906, vol. xlvii, p. 933.

² Ibid., p. 838

for four months was 80, while of those who were treated for only one or two months only 54 per cent. were cured for two years; 13 patients having simple ulcer were treated surgically (method not given), with the following results after two years: Cured, 46 per cent.; not relieved, 23 per cent.; died, 30 per cent.

There were 26 cases of chronic ulcer with gastrectasis. The results of medical treatment were: relieved (able to keep about by more or less constant treatment), 85 per cent.; unrelieved, 15 per cent.

There were 14 cases treated surgically with the following results: Cured, 64 per cent.; recurrence, 28 per cent.; died, 14 per cent.

Hewes concludes that at present patients having simple gastric ulcer should be referred to the surgeon only when medical treatment for four months has failed, or when malignancy is suspected; but that patients having chronic ulcer complicated by inability of the stomach to perfectly empty itself should be treated surgically as soon as the diagnosis is established.

Murdoch¹ gives the late history of 32 patients in private practice whom he treated medically for gastric ulcer prior to December 31, 1902. More than three years afterward he found that 2 had died, 1 from aneurism of the aorta and 1 from hemorrhage, the result of a recurrence of the ulcer; 20 patients were permanently cured; 4 were greatly improved, having had no return of the ulcer; 3 were not improved, and 3 could not be traced. Murdoch calls attention to the fact that Leube has sometimes been misquoted, being made to say that ulcers which cannot be healed medically in four or five weeks should be treated surgically. His attitude is quite different, as shown by this paragraph from his last treatise on ulcer of the stomach:

"Usually those cases which have after the first treatment been only improved, or have even remained uncured, will completely heal up after a second or third application of the treatment. The principal thing for physician and patient is not to flag in patience and consistency. I have seen that such repetitions of the treatment, even in ulcers of ten years and longer standing, worked at last a complete cure."

After Surgical Treatment. Kroenlein² gives the mortality following operations for gastric ulcer as 8 to 10 per cent. He is well satisfied with the late results. He found upon investigation that 61 per cent. of his patients were permanently cured and 24 per cent. were improved, 12 per cent. were not improved, and 3 per cent. had died from complicating carcinoma. The list of patients thus investigated numbered 67, most of them being treated by posterior gastro-enterostomy. Unfortunately for our purpose, he does not state definitely the time which had elapsed after operation when the report was made.

¹ New York Medical Journal, 1906, vol. lxxxiv, p. 284.

² Archiv f. klinische Chirurgie, 1906, vol. lxxix, p. 644.

Many of these patients were personally examined for him by Kreuzer, who found the results of operation (chiefly gastro-enterostomy) to be as follows:

1. A dilated stomach shrinks to normal, requiring a longer time to do so if the dilatation is great.
2. If the secretory function of the stomach is disturbed before operation, it becomes normal in most cases in a short time.
3. Hyperacidity usually disappears so that in some of these cases there was for a time less acidity than normal. This became normal again, however.
4. If there is no hydrochloric acid before the operation, it usually reappears soon after the operation.
5. A flow of bile into the stomach was observed in some cases, but it did not last long and was not particularly troublesome.
6. A flow of pancreatic fluid into the stomach has rarely been demonstrated.

Kroenlein is a strong believer in posterior gastro-enterostomy as a means of treating gastric ulcer. He says that no other operation will so quickly heal the ulcer, free the patient from decomposition of the gastric contents, and restore the normal functions of the stomach. In his judgment, excision of the ulcer should rarely be practised. The difficulty of locating some ulcers, the fact that ulcers are often multiple, and the technical difficulties of excision are all arguments against it. Furthermore, it does not improve the gastric conditions materially, and to produce a complete cure it must often be combined with gastro-enterostomy.

He does not consider plastic operations upon the pylorus to have any rational existence, and thinks that resection should only be performed when there is a suspicion of carcinoma.

Indications for operation are stenosis of the pylorus, marked motor insufficiency not relieved by medical treatment, and small, frequently recurring hemorrhage. If there has been a very large hemorrhage it is better to postpone operation until the patient has somewhat recovered.

Cases Reported in British Journals. The late results after gastro-enterostomy were traced by Paterson¹ in 116 patients whose operations were reported in British literature. These he tabulated as follows:

<i>Unsatisfactory Cases.</i>	
Died subsequently	4
Relapsed	4
Total	8
<i>Fairly Good Results.</i>	
Occasional dyspepsia	6
Some care in diet necessary	3
Total	9

¹ Lancet, 1906, vol. i, p. 491.

Cured of Gastric Trouble.

Died from other causes	2
Alive and well	97
Total	<hr/> 99

So that in only 8 cases, or 7 per cent., has the result of gastrojejunostomy been unsatisfactory.

Of the 4 deaths in the unsatisfactory cases, 2 were due to perforation of a peptic jejunal ulcer, three and two years after operation; a third patient was operated upon the second time for perforation and lived two years longer, dying of some abdominal complication—the nature of which is unknown; the fourth died of intestinal strangulation, due to adhesions. In 2 of the 4 patients who relapsed anastomosis was made with the Murphy button, and in a third the opening was only three-fourths of an inch in length. In 2 of the 6 cases classified as "fair" a Murphy button was used—as it was in 2 of the 3 patients who have to exercise care in their diet.

It is noteworthy that in all the cases Paterson was able to collect of contraction or closure of a gastrojejunostomy opening, either serous sutures alone or Senn's plates or Murphy's button were used. The reason why so many patients relapse after operation by these methods is because the opening is of insufficient size. In 4 cases the size of the opening is stated. In 1 case it was one and one-half inches and the patient had to exercise care in diet. In 2 others it was three-quarters of an inch and the symptoms soon recurred. In 1 cured patient the opening was only an inch, but as the operation was performed for pyloric ulcer, due to swallowing a corrosive poison, it is probable that only temporary relief was needed, and that the pylorus resumed its function as soon as the ulcer was healed.

Baker, Spencer, and Paterson all advocate large openings. Moynihan also makes a large opening. He has 32 patients in his list, 30 of whom are cured. Paterson uses two continuous sutures, the inner penetrating all the coats, controlling hemorrhage and preventing burrowing of intestinal contents. The outer one is serous only.

Paterson finds reports of 19 cases of peptic ulcer following gastro-enterostomy, not all in British literature however; in 14 of these the anterior operation was performed. The frequency is about 1 per cent. of all the gastro-enterostomies performed by the operators in question. He believes it can usually be avoided by making a large opening, and thus keeping the acidity of the stomach at a minimum.

Paterson has also tested the metabolism in 4 patients at periods varying from two months to two years after he had performed anterior gastro-enterostomy. His results showed that in no case did the unabsorbed nitrogen in the feces exceed the normal by as much as 2 per cent., while the unabsorbed fat was slightly more than 2 per cent. above normal,

These tests therefore confirm the clinical evidence that gastro-enterostomy properly performed does not disturb normal metabolism. Paterson prefers and still performs the anterior operation, but says that the future must decide whether it or the posterior operation gives a higher percentage of cures.

Paterson and Rhodes, for the sake of comparison, have traced 72 patients treated in the medical wards of the London Temperance Hospital from January, 1899, to December, 1903, and discharged as cured. The late results were:

Not cured	Signs of gastric ulcer	40
	Operation subsequently necessary	5
	Died from gastric disease	1
	Cured	19
	Probably cured	2
	Probably not cured	5
Total		72

Even counting as cured those set down as "probably not cured" there remain still 64 per cent. of the patients as failures of medical treatment.

The Value of Gastro-enterostomy. Clairmont¹ thinks that the benefits of *gastro-enterostomy* have been overestimated. He cites the late results in 91 cases operated upon in Eiselsberg's clinic. Ten of these patients died from the operation (11 per cent.). Investigation of those who recovered showed that a favorable late result was obtained in only 58 per cent. of the cases. He believes the difference in the results reported by different operators is in part due to the fact that no account is taken of the situation of the ulcer. His investigations have convinced him that a patient who has an ulcer at the pylorus will be improved by a *gastro-enterostomy*; whereas a patient who has an ulcer situated at some distance from the pylorus will only occasionally be freed of his pain by *gastro-enterostomy*. The method of operation should therefore vary according to the location of the ulcer.

Portis² says that no *gastro-enterostomy* can be looked upon as a harmless operation. The numerous recorded cases of ulcer of the jejunum and the various less severe forms of disturbed digestion which follow *gastro-enterostomy* are proof of this statement. Neurasthenic individuals who suffer from chronic dyspepsia, and patients with so-called atonic dilatation of the stomach are usually made worse by this operation. No operation is indicated in acute ulcer, unless perforation is imminent or has occurred, or serious hemorrhage compels it. *Gastro-enterostomy* is not indicated in chronic ulcer of the stomach, unless there are repeated

¹ Zentralblatt f. Chirurgie, 1906, Beilage, p. 104.

² Annals of Surgery, 1906, vol. xliii, p. 901

small hemorrhages which menace life, or grave adhesions, or persistence of marked symptoms even after prolonged and thorough medical treatment.

Gastro-enterostomy should always be done when the natural evacuation of the stomach is impossible and pyloroplasty or gastro-duodenostomy are not feasible. This includes the cases with mechanical obstruction due to pyloric stenosis and malformations due to hour-glass contractions or disabling perigastric adhesions. It is best to close off the pyloric opening.

Preservation of the Duodenal Route. Mackenzie¹ makes a plea for a more extended use of plastic surgery to preserve the duodenal route. It would appear to be of vital consequence to the health of an individual that the food that enters the stomach should pass through the pylorus and traverse the entire length of the duodenum. Free acid in the stomach causes the pylorus to open, and the acid chyme passes into the duodenum. Its presence there causes the pylorus to close and to remain closed until the acid chyme is neutralized by the alkaline pancreatic secretion. The transit of certain foods, and certain foods only, across the duodenum excites the flow of bile. These are the common truths of physiology. It would appear from the most elementary reasoning that gastro-enterostomy, by cutting out the duodenum from its special role in the digestive act, possesses serious drawbacks. Personal observations of many cases of gastro-enterostomy have convinced Mackenzie that many of these patients suffer afterward from various disorders, and that their sufferings do not commonly diminish with time. He feels that plastic surgery in the region of the stomach and duodenum, for the relief of stenosis, has not yet been accorded its due place in surgery. He cites 2 cases of stenosis with plastic operation, and 3 others in which a posterior gastro-enterostomy was performed. The honors seem about evenly divided.

The Late Results After Pyloroplasty. Finney² reports the after-results of 33 pyloroplasties: 4 patients died after operation, but in no one of them, as autopsy showed, was the death to be attributed to the operation. The operation was performed five times for acute ulcer; 4 patients recovered and are well; 1 has not been heard from. There were 16 operations for healed ulcer with stenosis: 15 patients are well, the other has not been heard from; 9 dyspeptics were operated upon, 4 of these are well, 1 is improved and 2 died; 1 has not been heard from, and 1 was operated on too recently to be considered. There were 2 cases of obstruction with gastro-succorrhea; both patients are improved; 6 operations were upon neurotics; 3 of these patients were unimproved, 1 is improved.

¹ Journal of the American Medical Association, 1906, vol. xlvii, p. 341.

² Ibid., p. 934.

Mortality of Gastro-enterostomy. Mayo¹ reports but 1 death in 135 "no loop" operations. He says the anterior method is occasionally demanded by reason of posterior adhesions or abnormalities in the mesocolon, or duodenojejunal juncture; but as it sacrifices eighteen to twenty inches of the most important part of the upper jejunum, it cannot be considered a close rival to the posterior operation.

Paterson² puts the mortality at 3 per cent., when the operation is performed by the best surgeons, for non-malignant disease.

THE EFFECT OF GASTRO-ENTEROSTOMY UPON ULCER. Fibich³ performed some experiments, the results of which are of the utmost importance, in the domain of gastric surgery. By them he established four propositions:

1. If the vessels deep in the wall of the stomach of a dog are ligated, and if a portion of the mucous membrane is excised, and if the edges of the wound are cauterized with hydrochloric acid, the resulting ulcer will not heal for a long time (Fig. 21); whereas simple wounds in the mucous membrane of the dog heal very rapidly.



FIG. 21



FIG. 22

FIG. 21.—Ulcer of the stomach artificially produced by excision of 1.5 cm. of mucous membrane and cauterization with hydrochloric acid. Dog killed in four days. Ulcer 1 cm. in diameter with infiltrated base. (Fibich.)

FIG. 22.—Section of stomach from dog similarly treated plus a gastro-enterostomy, and killed in three days. The scar of the completely healed ulcer is shown. (Fibich.)

2. If a chronic ulcer is produced in the manner above described, and gastro-enterostomy is performed, the wound will heal like a simple wound in three days (Fig. 22).

3. If the artificial chronic ulcer has existed some time without showing a tendency to heal, it can also be made to heal in a few days by the performance of gastro-enterostomy.

4. The healing action of the gastro-enterostomy is not due solely to

¹ Journal of the American Medical Association, vol. xlvii, 1906, p. 931

² Lancet, 1906, vol. i, p. 491.

³ Archiv f. klinische Chirurgie, 1906, vol. lxxix, p. 900.

the easy escape of the contents of the stomach, since this produced experimentally is not sufficient to heal the ulcer.

Fibich tested this in 2 cases by performing gastrostomy and inserting so small a tube that only fluid could escape through it. One of the dogs so treated died in two days of pneumonia; the other recovered promptly, and was killed on the sixth day. The fistula had drained properly in both dogs. In neither was there any attempt toward healing of the ulcer. König has stated that the good effect of a gastro-enterostomy is due to the speedy emptying of the stomach, thereby saving the ulcer from the long-continued irritation of fermenting food. Whether or not this is the only good result Fibich was not able to prove.

Katzenstein¹ says that gastro-enterostomy does not heal an ulcer by emptying the stomach quickly, for experiments have shown that the food remains in a stomach so operated upon as long as it does in a normal stomach. The favorable effect is due to chemical changes in the stomach and especially to a reduction of the hyperacidity. He recommends the use of a large amount of fat during the convalescence. This combines with the bile and pancreatic juice, which may find their way into the stomach, and thus avoids vomiting. He gives his patients cream on the first day after operation, and soon after that butter, bacon, etc.

COMPLICATIONS AFTER GASTRO-ENTEROSTOMY. Burke² operated upon a patient six months after an attack which he had diagnosticated as perforation of a gastric ulcer. He found the stomach attached to the transverse mesocolon, at apparently the site of a previous ulcer. Gastro-enterostomy by a Connell suture and a button entero-enterostomy were performed. The patient had absolute relief from gastric disturbance, and in four months gained thirty pounds; then the old symptoms came back. The abdomen was reopened; the gastro-intestinal anastomosis had constricted until it would hardly admit the tip of the little finger. Adhesions about the efferent loop of intestine constricted its lumen. The gastro-intestinal anastomosis was incised and made larger. Some encapsulated celluloid was removed. One year later the patient was in perfect health.

Burke³ also reports an instance in which posterior gastro-enterostomy made to improve gastric drainage not only accomplished this end, but stopped epileptic fits, from which the patient had suffered for thirteen years. At operation the stomach was found dilated and displaced so far downward that the lesser curvature was on a level with the umbilicus. There were no ulcers nor cicatrices.

Peptic Ulcer of the Jejunum. According to Gosset⁴ there are clinically three groups of peptic ulcer following gastro-enterostomy: (1) The patient may notice no abnormal symptoms until the ulcer perforates.

¹ Zentralblatt f. Chirurgie, 1906, Beilage, p. 101.

² Buffalo Medical Journal, 1906, vol. lxi, p. 529.

³ New York Medical Journal, 1906, vol. lxxxiv, p. 638.

⁴ Revue de chirurgie, 1906, vol. xxxiii, p. 54.

(2) The patient, after varying intervals of freedom from pain, begins to have symptoms similar to those of the previous gastric ulcer, and in the region of the upper half of the left rectus a tender infiltration of the abdominal wall can sometimes be made out. (3) In addition to these two types of ulceration, the peptic ulcer may adhere to the transverse colon, or some other portion of the intestine, and burst into it. There will then be diarrhea, fecal vomiting, and rapid emaciation.

Lyle¹ points out that no case of jejunal ulcer following gastro-enterostomy for carcinoma has as yet been reported. He gives an extract of 32 cases of peptic ulcer which have been reported, including 1 of his own. His patient was given the treatment for gastric ulcer recommended by Luebe, and made a good recovery.

Kocher is of the opinion that contraction of the intestine below the anastomosis stagnates the food and favors the occurrence of peptic ulcer. Mikulicz attached importance to the circulatory changes which follow gastro-enterostomy. In his clinic, where the transverse implantation of the jejunum was employed, the bloodvessels of the intestine were only slightly interfered with, and no cases of peptic ulcer have occurred.

Graser² has seen peptic ulcer of the jejunum with perforation and fatal hemorrhage four years after posterior gastro-enterostomy with Murphy's button. The anastomosis was reduced to the size of a lead pencil. On account of such contraction, which he has seen a number of times, he has given up the use of the button for this operation.

Treatment of Gastric Hemorrhage. Rodman³ says that in the large hemorrhage which accompanies acute ulcer of the stomach, surgical intervention is wholly unnecessary. Of all the remedies employed for arresting such hematemeses, none acts so promptly and so certainly as hot water (temperature 120° to 130°) introduced through a stomach tube.

The hemorrhage in chronic ulcer is usually from a large artery and is recurrent. After the second attack operation should be performed. The stomach should be opened, and a direct search made for the bleeding vessel, with a speculum and electric light. If it can be found, the ulcer should be excised or a partial gastrectomy performed. The next best method is the ligation of the mucous membrane *en masse*, so as to draw a cone into the stomach. Transfixion of the bleeding surface and ligation have also succeeded. Cauterization is theoretically unsafe, and has in several cases caused perforation. Should the search for the bleeding point prove futile, the opening in the stomach may be utilized for gastro-enterostomy. Rodman does not advocate this procedure for hemorrhage except as a last resort. That it will relieve capillary bleeding is likely; that it will arrest hemorrhage from a vessel of con-

¹ New York Medical Journal, 1906, vol. lxxxiv, p. 1230.

² Zentralblatt f. Chirurgie, 1906, Beilage, p. 103.

³ Journal of the American Medical Association, 1906, vol. xlvii, p. 842.

siderable size is questionable. Fatal cases of hemorrhage after apparently successful gastro-enterostomies have been reported by Mayo, Deaver, Kocher, Robson, Moullin, Connell, Czerny, Rydygier, Kümmell, von Eiselsberg, Körte and many others.

Postoperative Gastric Paralysis. Bustedo¹ reports 3 cases of acute dilatation of the stomach which may be summarized as follows: In Case I the acute dilatation was due to paralysis of the stomach, pylorus, and probably part of the duodenum, a condition which quickly followed an operation for the removal of both tubes and one ovary. The retching and the bile-stained stomach contents indicated that the pylorus was open and was presumably involved in the paralysis. The bowels were not paralyzed, as they moved freely under treatment. There was no history of any previous stomach derangement.

Noteworthy in this case, as in some of the other reported cases of postoperative gastric dilatation, is the large amount of secretion, in appearance like that obtained from the fasting stomach in cases of gastrosuccorhea, with the addition of bile, and the fact that vomiting does not seem to notably lessen the distention, or belching bring forth any large quantity of gas.

Would it not be better to employ the term "gastric paralysis" for these postoperative cases, as it is directly analogous with the much used term "intestinal paralysis," and is more indicative of the actual condition than is the name "acute dilatation"? Besides, in these cases the dilatation is undoubtedly only incidental to the paralysis.

In Case II the acute dilatation supervened upon a chronic dilatation. The immediate etiological factor was an abnormally large meal of material so imperfectly masticated that it would not pass the pylorus, ingested into a stomach which already contained an accumulation of fermenting contents. The pylorus was active and, probably owing to the irritating fermenting stomach contents, tightly closed; the stomach wall still retained its muscular power; and the nerves and centres were intact and functional, as shown by the prompt response to a hypodermic of apomorphine. Surely in this case there was acute dilatation without paralysis.

In Case III the acute dilatation was due to the sudden generation of carbon dioxide gas, in a quantity greater than the stomach could hold, its escape into the intestine being prevented by a pyloric obstruction. The muscle of the stomach wall was strong and active, both before and after momentary overdistention of the viscus, and there was evidently no paralysis.

Acute dilatation of the stomach, then, may be paralytic or non-paralytic, and postoperative abdominal distention may be due to gastric paralysis as well as to intestinal paralysis.

¹ Medical Record, 1906, vol. lxx, p. 733.

Finney¹ reports a case of *pyloroplasty*, followed by vomiting, slight elevation of temperature, and death from collapse on the sixth day. There was no leakage at the point of suture and no peritonitis. The stomach was moderately dilated and the duodenum more so up to the point where it passed through the mesentery beneath the superior mesenteric vessels. Beyond this point it was collapsed, as was also the small intestine. The finger, when introduced into the lumen of the duodenum, met a definite obstruction in the crossing of the vessels which was relieved as soon as the small intestine was lifted out of the pelvis. Finney calls this a case of *gastromesenteric ileus*, adopting Zade's nomenclature. He believes that many cases of so-called acute dilatation of the stomach are really cases of gastromesenteric ileus.

Albrecht, who has also written on this subject, believes that in order that the small intestine, as a whole, may find room in the pelvis, it is necessary that it should contain an unusually small amount of solid or liquid. If these conditions are fulfilled, the small intestine, on account of its weight, sinks into the pelvis when the body is placed upon its back, thus producing closure of the duodenum by means of the traction on the superior mesenteric artery; the lumen of the duodenum being already relatively narrow. He thinks that the occurrence of this obstruction in no way depends upon an abnormal length of the mesentery or unusually pronounced lordosis of the lumbar vertebræ, or an abnormally low position of the duodenum, although he admits that the presence of these conditions may constitute favoring factors. The sinking of the small intestine into the pelvis, he thinks, is especially brought about by means of pronounced gastric dilatation.

Finney's conclusions are as follows:

1. Acute dilatation of the stomach and gastromesenteric ileus cannot be differentiated clinically.
2. Obstruction to the lumen of the duodenum by the root of the mesentery and the contained superior mesenteric vessels has been demonstrated, and is probably of more frequent occurrence than has been supposed.
3. Whether this is primary or secondary to the gastric dilatation, or whether this relationship is a constant one, has not been determined.
4. The diagnosis would appear to be more easy than past failures seem to indicate.
5. The use of the stomach tube and avoidance of dorsal decubitus offer better results probably than secondary operation, owing to the unsatisfactory conditions existing.
6. With earlier diagnosis and the early institution of the measures just suggested, an improvement in the very high rate of mortality can be confidently expected.

¹ Boston Medical and Surgical Journal, 1906, vol. clv, p. 107.

ACUTE DILATATION OF THE STOMACH. MacEvitt¹ says that restlessness and nervous irritability are the prodromes, followed by vomiting. This may be a continuation of that caused by the anesthetic or it may commence long after the stomach has been functionally well. At first the vomit contains particles of ingesta; later it is composed of thin, watery, greenish material, evacuated in surprising quantities, a gallon or more in twenty-four hours. With increased distention the intervals between vomiting become greater, and the vomiting may cease altogether and nourishment be retained. This is a peculiarly deceptive symptom. Distention is more marked in the upper abdomen, increasing gradually downward. Temperature is not above 100°, the pulse is rapid and weak, and the urine scanty. The bowels may move naturally or with enemas. He reports a most instructive case. Four days after a vaginal hysterectomy the patient's condition was so desperate that without suspecting the cause he reopened the abdomen. To quote his own words, "Bulging outward, making an ellipse of the opening in the abdominal wall, there appeared a bluish-white tumor resembling in appearance an ovarian cyst, but without its glistening surface. Passing my hand between the tumor and the abdominal walls, I found it completely filled the abdominal cavity, extending into the pelvis. I could feel no coils of intestine. It was only after reaching upward over its anterior surface to the diaphragm and liver that I recognized the fact that the tumor was the enormously distended stomach. I was at a loss to determine what procedure to adopt. From its resonance I believed it to contain gas alone. Its size precluded the possibility of any further investigation of the remaining abdominal viscera. On impulse, I was about to make a small incision into the walls, when better judgment dictated the use of a stomach tube, through which the gas escaped and about three quarts of feculent fluid, the stomach gradually contracting down to about its normal size. Pitcherfuls of hot saline solution were poured into the peritoneal cavity as a stimulating medium to the intestinal walls, without producing any evidence of peristalsis. The wound was then closed with through-and-through sutures of silkworm-gut, without drainage. The rubber tube was again introduced and it required repeated filling and emptying of the stomach with water before it returned clean and odorless. The patient was then put to bed and its foot elevated. My general instructions to the house surgeon were to wash out the stomach every six hours." The patient made a good recovery.

With regard to treatment MacEvitt says that by proper dieting in advance we may prevent the occurrence of acute gastric dilatation, but the possibility of its occurrence should ever be borne in mind, and after operations requiring prolonged anesthesia the stomach should be washed.

¹ New York State Journal of Medicine, 1906, vol. vi, p. 284.

When vomiting persists beyond twelve hours, an inspection of the abdomen should be made, the dressings being removed for the purpose. If the stomach is found dilated, it should be repeatedly washed out, no matter what the prostration of the patient, with some mild antiseptic solution. Herein lies the hope of preventing extreme distention. Nourishment should be given by rectum and medication, preferably strychnine, hypodermically.

The latest article upon this subject is by Conner.¹ He reviews 102 cases, including 1 of his own. His conclusions are almost identical with those of Finney given above. His own case is the more remarkable

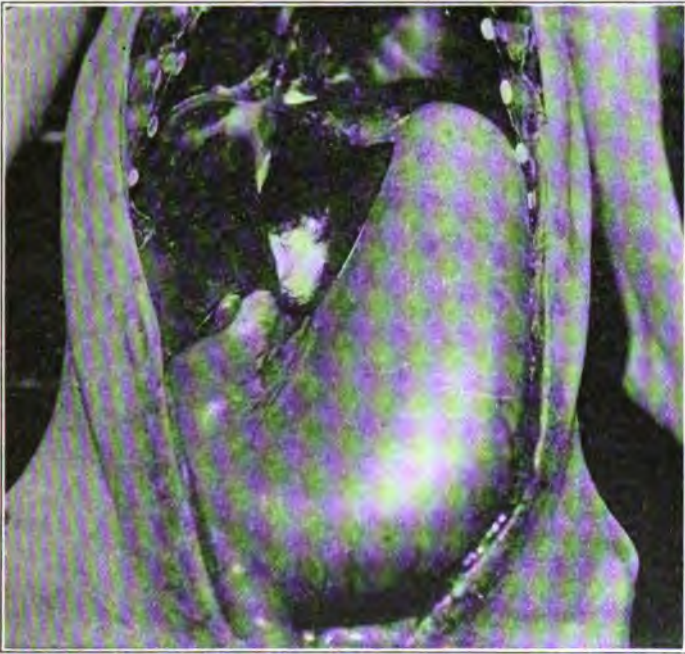


FIG. 23.—The dilated stomach due to mesenteric obstruction of the duodenum. (Conner.)

in that death occurred within three hours after the onset of pain and distention. The patient had been for four weeks in the hospital, suffering from chronic tuberculosis of the bronchial glands, with acute general miliary tuberculosis. The illustrations show clearly the amount of gastric and duodenal distention, and how the latter was sharply limited by the root of the mesentery.

Conner says that the first step in treatment, whatever the cause of the dilatation may be, is the prompt and complete emptying of the stomach by means of the stomach tube. Owing to the often enormous

¹ American Journal of the Medical Sciences, 1907, vol. cxxxiii, p. 345.

size of the organ and the flaccid state of its walls, this is not always a simple task. The tube must be made to reach the most distant and dependent parts of the stomach, and changes in the patient's posture may be necessary in order that all the contents may be reached. This emptying of the stomach should be repeated at regular intervals, usually several times in the twenty-four hours. Food or drink by mouth should be absolutely interdicted. The excessive loss of fluid should be met by

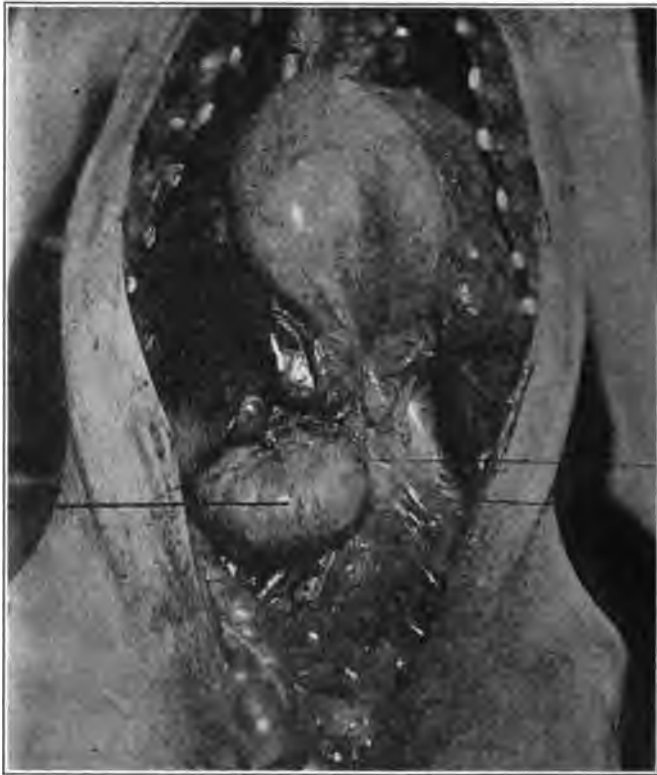


FIG. 24.—View of the same case, after the stomach had been turned upward and the transverse colon removed, showing the greatly distended duodenum, the constricting root of the mesentery, and the collapsed first portion of the jejunum. *a*, dilated duodenum; *b*, root of the mesentery; *c*, collapsed jejunum. (Conner.)

large saline enemas or by hypodermoclysis. Nutrition should be maintained as well as possible by rectal feeding.

Operation for acute gastric paralysis has usually been followed by death.

Cardiospasm. Erdmann¹ reports a case of this rarely mentioned affection in which a cure was brought about by incising the stomach,

¹ *Annals of Surgery*, 1906, vol. xliii, p. 224.

passing the hand into it and inserting first one finger and then two and then three through the contracted cardia, and gradually stretching it until the dilatation was sufficiently great to be permanent. Before operation all mechanical and medicinal means that promised relief had been tried without success. The patient had lost fourteen pounds in one month. One year after operation the patient was in excellent health, having gained thirty-five pounds, and she was able to eat without



FIG. 25.—Cardiospasm; insertion of hand into stomach, and stretching of the cardia with two fingers. (Erdmann.)

difficulty all the usual articles of food. The condition is diagrammatically shown in Fig. 25.

An extensive article by Mikulicz¹ upon this subject appeared in 1904. He reported 4 cases all cured by operation. Two principal symptoms are said to be a pear-shaped dilatation of the lower part of the esophagus

¹ Deut. med. Wochenschrift, 1904, vol. xxx, p. 17.

which may be so great as to contain a pint or more of fluid; which can be siphoned out without disturbing the contents of the stomach and secondly dysphagia of the cardiac type due to esophagitis with or without erosions produced by the retention of fermenting acid fluid in the pouch.

Pyloric Spasm. Mayo¹ in his Mütter lecture delivered in Philadelphia December 4, 1906, says: "We (William and Charles Mayo) have had a surgical opportunity in a considerable number of cases to examine the stomach during that contraction of the pyloric canal and antrum which constitutes pyloric spasm. This muscular contraction when present causes the patient to experience a sensation which he speaks of as gas pain. It can be observed in operative examination under local anesthesia. The peculiar appearance of the stomach during pyloric spasm may give rise to the belief that physical disease exists, because of a roughened, puckered appearance which lasts a fraction of a minute and then changes position or develops a rhythmic contraction, confined to the antrum. In the most extreme degrees we have found it in connection with stones in the appendix, impacted gallstones, tuberculosis of the intestine, and chronic intestinal obstruction of various kinds. Clinically it would appear that irritation of any part of the gastro-intestinal canal and allied organs, the liver and pancreas, may produce pyloric spasm, and that this condition may overshadow the local disease.

"Cannon in his experimental work found that after severe injury to the intestinal wall the pylorus became closed and remained so for several hours. It would appear that control of the pyloric sphincter is vested not only in the stomach and duodenum, but also in all the derivatives of the midgut (jejunum, ileum, cecum, and colon nearly to the splenic flexure), and that pyloric spasm may and often does originate in the attempt to prevent food entering the irritated intestinal tract, or in some instances a perversion of the physiological function. The greatest care is necessary in differentiating these cases from gastric ulcer and other inflammatory conditions. While it is possible that pyloric spasm may exist as the result of mucous ulcer, as believed by Eiselsberg and Doyen, such is not my conviction. Although spasm will mimic gastric ulcer clinically, and is often diagnosticated as such, I am inclined to look with a great deal of suspicion upon any supposed ulcer of the stomach which cannot be absolutely demonstrated, not only to the operator, but to onlookers as well."

Hour-glass Stomach. Schmidt has reported 13 cases of hour-glass stomach, confirmed by operation, although the diagnosis was not always made before the abdomen was opened: 2 were due to carcinoma; 7 to scars following ulceration; in 1 case there was a perigastric band, while the other 3 cases were spastic. A pre-operative diagnosis had been made in these latter cases, and yet when the abdomen was opened the

¹ American Journal of the Medical Sciences, 1907, vol. cxxxiii, p. 1.

stomach was found free from adhesions, scars, and tumor; so that the diagnosis would have been in doubt, and the symptoms would have been ascribed to nervousness except for the fact that the contraction of the centre of the stomach took place before the eyes of the operator, lasted about a half-minute, disappeared entirely, only to return a few minutes later. The contracted portion was a zone from 4 to 6 cm. (1.6 to 2.4 inches) broad. When fully contracted its diameter was less than 4 cm. (1.6 inches). This contraction was quite distinct from the normal peristaltic waves. In a fourth case perigastric bands had apparently interfered with the motor function of the stomach. There was no hour-glass contraction of this stomach at operation, but such contraction was afterward observed very distinctly by mixing bismuth with the food, and examining the patient with the *x*-rays. The hour-glass contraction recurred every five or ten minutes for two or three hours after taking food. In none of these 4 patients was there any contraction of the pylorus, or any evidence of ulcer of the mucous membrane. In 1 of Schmitt's cases the hour-glass stomach was associated with stenosis of the pylorus. As the constriction of the stomach itself was very near the cardia, this was overlooked at operation, and, the gastro-enterostomy failing to relieve the upper obstruction, the patient died. In another case pyloric stenosis developed some months after a successful plastic operation had been performed for the relief of the hour-glass condition. Ten months after the first operation the new symptoms were successfully overcome by gastro-enterostomy and the patient has remained well for five years since.

The symptoms of hour-glass stomach are similar to those of pyloric stenosis, but there are sufficient differences to establish the diagnosis. First, the vomiting comes on almost immediately after eating if the stenosis is near the cardia; it comes on in two or three hours if the stenosis is in the middle of the stomach, and at the end of digestion if it is near the pylorus. The vomited material is at first comparatively unchanged, and later bitter, or sour; but this may be the case with pyloric stenosis and dilatation.

The act of vomiting is apt to be much more painful than is the case with other stenoses.

The intense pain of hour-glass stomach differs from that of ulcer in that it lasts longer, and is less a cramp than it is a pain of stretching, similar to that produced by a too great distention of the stomach with carbonic acid gas. Moreover, the pain does not so quickly subside after vomiting as does the pain of ulcer or pyloric stenosis; on the contrary, it usually lasts half an hour.

If a patient with ulcer is put to bed on a fluid diet for two weeks, and then gets up and takes solid food, his pain does not come back at once, whereas under similar conditions the first solid meal will produce intense pain in an hour-glass stomach.

The most reliable symptom of all is the return of foul fluid after the stomach has been washed clean. This is due to the regurgitation of material from the pyloric into the cardiac sac. This symptom is not observed at every washing out of the stomach, but it was obtained at one time or another in more than one-half of Schmitt's cases. It is more likely to be obtained if the patient is turned or bent to the left side after the cardiac sac has been washed clean. The patient should also have been in an upright position for some time before the test is made.

The escape of fluid from the cardiac to the pyloric sac and the distinct bilobulated shape of the stomach when it is distended with fluid or gas are good symptoms, if they can be obtained. The same is true of gurgling produced by the stenosis, but this must be differentiated from the sounds produced in the normal or in a dilated stomach. The results of passing an electric light into the stomach are uncertain.

Examination with the x-rays after a meal mixed with bismuth was found to be very reliable. Such examination must be made long enough after the food is taken to permit a considerable quantity to pass into the pyloric sac. This may require several hours. By this test a diagnosis of hour-glass stomach may be made in a spastic case.

Schmitt recommends posterior gastro-enterostomy as the normal method of treatment. In some cases gastro-anastomosis seems indicated, but should be combined with gastro-enterostomy. In one case he resected the whole ring of stenosis on account of carcinoma. Separation of adhesions or the mere stretching of a constriction are not in themselves sufficiently thorough treatment.

Results of Operation. Paterson¹ has been able to collect the early results following 92 operations for non-malignant hour-glass stomach; and the late results in 61 of the 92 patients who survived operation. They are:

Gastroplasty: 43 operations, 4 deaths.

Complete relief	16
Relief, but not perfect	3
No relief	1
Relapse	9
Immediate relief (later history unknown)	7
No report	3
Total	39

Gastrogastrostomy: 14 operations, 1 death.

Complete relief	1
Relief with death from other causes	1
No relief	3
Relapse	2
Immediate relief (later history unknown)	2
No report	—
Total	13

¹ Lancet, 1906, vol. i, p. 503.

Gastrojejunostomy: 19 operations, 4 deaths.

Complete relief	10
Relief after second operation	1
Relapse	1
Immediate relief (late history unknown)	3
Total	15

Gastrojejunostomy following *gastrogastrostomy*: 1 operation, with complete relief.

Gastrojejunostomy following *gastroplasty*: 6 operations; complete relief in 5; death in 1.

Gastrogastrostomy following *gastrojejunostomy*; 3 operations, all with complete relief.

Excision of ulcer: 2 operations, 1 death, 1 relapse.

Gastroplasty and *pyloroplasty*: 1 operation, with death.

Pylorodiosis, with *gastrojejunostomy*; 1 operation, with death.

Gastroduodenostomy: 2 operations; 1 relief, 1 death.

Dilatation with *gastrojejunostomy*: 1 operation; immediate relief, later history unknown.

Dilatation: 1 operation, with complete relief.

Gastroplasty and *gastrogastrostomy* are not preventives of gastric ulcer, and do not modify the conditions predisposing to gastric ulcer which are presumably present in these cases. They are therefore unsatisfactory methods of treatment, especially when acute ulceration exists; 25 or 30 per cent. of these operations have been followed by relapse. If performed, a *gastrojejunostomy* should be performed at the same time, or in place of this double operation a single loop of jejunum may be anastomosed to each pouch of the stomach.

CONGENITAL HOUR-GLASS STOMACH. Flammer¹ reports a successful operation for a supposedly congenital hour-glass stomach, the patient, a woman, being thirty-nine years old at the time. The pylorus was also stenosed, but whether this was a congenital or acquired condition could not be decided, as it was impossible to bring the pylorus clearly into view. The stenosed portion of the stomach was resected and sutured, and *gastrojejunostomy* was performed, the pyloric end of the stomach being utilized. The patient recovered completely. The question of congenital hour-glass stomach is still under discussion, some writers, as Moynihan, claiming it to be very rare, and others, as Lieblein, claiming that the congenital cases exceed in number the others. In the congenital cases the stricture is longer and narrower than in the acquired; it is in the middle of the stomach or nearer the cardia than the pylorus; and there is no trace of ulcer nor cicatrix in the gastric wall of the stenosed portion.

Pyloric Stenosis in Infants. Paterson² says there is little doubt as to the possibility of recovery without operation, even in cases with dilated

¹ *Beit. zur klin. Chirurgie*, 1906, vol. lii, p. 581.

² *Lancet*, 1906, vol. i, p. 574.

stomach and a decided pyloric tumor. Success demands early recognition of the disease, and treatment by lavage and careful feeding for a long time, probably some weeks. It is noticeable that in the cases which have recovered after Loreta's operation vomiting has not ceased immediately and careful feeding has been required for some time.

The results of various operations which Paterson has been able to collect are as follows:

	Immediate results.			Late results.		
	Recovery.	Deaths.	Total.	Recovery.	Deaths.	Total.
Gastrojejunostomy	12	13	25	9	3	12
Pylorodiosis	15	6	21	(Several relapses).	2	15
Pyloroplasty	6	3	9	5	1	6

Paterson prefers gastrojejunostomy to other operations for the following reasons:

1. It is preferable to operate on normal rather than on morbid tissues.
2. Feeding can be commenced at once.
3. The anterior operation can be performed in twenty-five minutes.
4. A two and one-half inch incision suffices. If the shoulders are raised there is no risk of prolapse of the intestine.
5. The remote results are the best as far as one can judge.

The figures given by Cautley,¹ show a less favorable outcome after pyloroplasty, namely, 14 operations with 7 recoveries, and 2 of these patients dead within three months from gastro-enteritis. His figures for gastro-enterostomy give 34 operations with 16 recoveries.

Fisk² reports 71 operations for pyloric stenosis in infancy, assigning to gastro-enterostomy a mortality of 42.5 per cent.; to pyloroplasty, a mortality of 45.4 per cent.; to divulsion, a mortality of 50 per cent. Most authors who have written upon this subject have expressed a preference for gastro-enterostomy. Fisk agrees with Cautley and Dent, who prefer pyloroplasty—an operation which can be performed more quickly and through a shorter incision. Fisk also regards it physiologically, anatomically, and surgically as the more correct procedure. He advises against delay in these cases.

OPERATION IN ADULT LIFE FOR CONGENITAL PYLORIC STENOSIS. Lennander³ operated upon a young man at the age of twenty-two, whose symptoms seemed to indicate that he had a narrowing of the pylorus at birth. At the age of twenty he had hemorrhage of the stomach and two or three months before his operation he had two attacks of intestinal obstruction, with dilatation of the stomach, which he recovered from. He was operated upon in the third attack, about five hours after its onset. There was a volvulus of the small intestine, with acute dilata-

¹ *Lancet*, 1906, vol. i, p. 705.

² *Annals of Surgery*, 1906, vol. xlv, p. 1.

³ *Deutscher Zeitschrift f. Chirurgie*, 1906, vol. lxxxv, p. 151.

tion of the stomach, and a large gastric hemorrhage. The intestine was placed in its proper relations, an enterotomy was performed for the removal of intestinal contents, and an enterostomy in the upper portion of the jejunum. The thickening of the pylorus was also noted, but there was no scar or infiltration around an ulcer. A gastrostomy was performed so that the stomach might have complete rest. Two weeks later adhesions about the jejunal loop produced a kink and total obstruction. Under cocaine a Y-gastro-enterostomy was performed, after which the patient made a prompt recovery, and was in excellent health seven months later. Lennander calls attention to the fact that the distended stomach and intestine seemed absolutely paralyzed until the contents were washed out. As soon as this was done they began to contract.

Gastroptosis. Eve¹ believes that in many cases of gastroptosis the lesser omentum is too weak to stand the strain of sutures (Beyea's operation), and that sutures placed through the lesser curvature of the stomach and through the attachment of the lesser omentum to the liver will far better support the prolapsed stomach. If the liver itself needs support its left lobe can be sutured to the costal margin. Eve has operated in this manner a number of times with complete success.

Can Gastric Ulcer become Carcinomatous? In 1890 Kollmerr made the statement that in his twenty years' experience he had never observed a single case of malignant development in an ulcer of the stomach. Such a statement is today almost unthinkable, so numerous have become the reports to the contrary; so that the possibility of cancerous development is one of the reasons given for surgical intervention in gastric ulcer. Blake² takes the advanced ground that if we wait until we can say "this patient has cancer, and therefore he should have an operation," we shall find in a great majority of instances the hope for cure, and even for palliation, is past. He reports 24 cases operated upon for diagnosis, or in the hope of improving the patient's condition: 6 could not be benefited in any way. A gastric fistula for feeding was established in 2 cases; gastro-enterostomy to improve drainage in 10 cases; while partial gastrectomy was performed in only 6 cases; so that there was a chance for cure in only one-fourth of these patients. He believes that operation should be performed whenever there are symptoms of indigestion occurring without explainable cause and increasing steadily, and combined with even slight evidences of motor insufficiency.

Gilbride³ takes a similar stand. Tumor is not an early sign in malignant disease of the stomach, and a very large tumor may be present and still escape detection. If after a careful examination of the case reasonable grounds are found to exist, leading us to suspect the presence of malignancy, the best interest of the patient will probably be served

¹ British Medical Journal 1906, vol. i, p. 784.

² New York Medical Journal, 1906, vol. lxxxiv, p. 821.

³ Ibid., p. 428.

by recommending an exploratory laparotomy, rather than to wait for a tumor to confirm the diagnosis.

Carcinoma of the Stomach. Tansini¹ emphasizes the importance of early laparotomy in suspected cases, as the risk is very slight at an early stage of the disease. Jaundice is a contra-indication, indicating an extension of the cancer in the common duct. If the supraclavicular glands are enlarged and this is the only contra-indication to operation, he excises one of them and examines it microscopically, as their enlargement may be due to simple inflammation. If it is not cancerous he proceeds with the laparotomy. He refuses to operate when there is ascites and a swelling of the superficial abdominal veins. Cancer of the pylorus or near it is easily diagnosticated and the results of operation are proportionately good. Emaciation depends largely on the pyloric stenosis; so that if the cancer is confined to the lesser curvature there may be little interference with the function of the stomach, and little or no emaciation for a long time. Cancer near the pylorus, on account of its mobility, may be mistaken for a wandering kidney or even a wandering spleen. He does not wash the stomach out previous to operation, as this is so disagreeable to most patients.

Moullin² recommends direct palpation of the stomach through an incision made as soon as there is the first suspicion of cancer.

Dunham³ was consulted by a man aged fifty-two years, six months after symptoms of indigestion began; there was already a small, movable tumor in the epigastrium. He made a diagnosis of carcinoma and advised immediate operation. The advice was not followed until five months later, when on account of the cancer about three inches of the stomach, including the pylorus, was resected by Hamilton, and a posterior gastro-enterostomy was performed. Dunham writes that the patient is well twenty-five months after operation, having gained thirty pounds. This case and one reported by Torek⁴ disprove the statement so often made, that it is useless to attempt a radical operation in carcinoma of the stomach whenever a tumor can be felt. In Torek's case the tumor could not only be felt, but seen protruding through the emaciated abdominal wall. The patient was a woman, aged forty-eight years, who had had symptoms for more than a year. The tumor was situated at the pylorus, which it completely encircled. An incision was made across the duodenum one inch below the tumor, and across the stomach two inches above the tumor. The opening in the stomach was sutured, except at the lower part, where it was united with the duodenum by a Murphy button (Billroth's first method). Fourteen months later the patient was in good health, and had gained forty-five pounds.

¹ *Riforma medica*, 1906, vol. xxii, No. 18.

² *Lancet*, 1906, vol. ii, p. 773.

³ *New York Medical Journal*, 1906, vol. lxxxiv, p. 217.

⁴ *Medical Record*, 1906, vol. lxix, p. 927.

GASTRECTOMY FOR CANCER. Paterson¹ has collected records of 436 operations performed by experienced surgeons for cancer of the stomach showing a mortality of 28 per cent.

	Cases.	Deaths.
Maydl	25	4
Kocher	101	26
Mikulicz	100	37
The Mayos	43	7
Krönlein	50	14
Roux	39	13
Kappeler	30	8
Garre	26	7
Hartmann	22	7
	<hr/> 436	<hr/> 123

The late results are as follows:

	Recovered from operation.	Have since died.	Alive and well three years later.	Alive and well five years later.
Total gastrectomy	17	5	6	3
Subtotal gastrectomy	14	6	3	3
Partial gastrectomy	55	35	12	5
Totals	<hr/> 86	<hr/> 46	<hr/> 21	<hr/> 11

NEW METHOD OF RESECTION. Graser² suggests a new method of uniting the stomach and intestine in cases of extensive resection. He

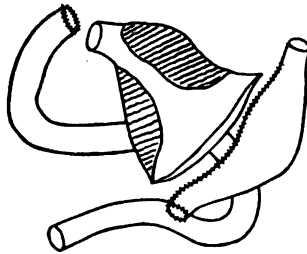


FIG. 26.—New method of resecting the stomach. (Graser.)

closes the end of the duodenum, and implants the stomach into the jejunum, after suturing the surplus opening in it (Fig. 26).

COMPLETE EXTIRPATION OF STOMACH. Vassalo³ reports the successful removal of the entire stomach for cancer, the operation lasting only thirty-eight minutes. Four months later the patient was examined. He was in excellent health and experienced no pain nor difficulty in digestion. He was obliged, however, to take small meals at frequent intervals.

Vassalo has performed 17 pylorectomies with only 1 death.

¹ Lancet, 1906, vol. i, p. 580.

² Zentralbl. f. Chirurgie, 1906, Beilage, p. 103.

³ Sem. Medica, Buenos Aires, April 19, 1906.

SARCOMA OF THE STOMACH. Yates¹ points out that sarcoma of the stomach is not so rare as has been supposed. Some writers have estimated it as high as 5 per cent. of malignant tumors of the stomach. It produces symptoms similar to those of carcinoma, namely, hematemesis, melena, and a slowly growing tumor. Pain is a most common symptom. Prompt radical treatment offers the only hope of permanent relief. The mortality should not exceed 10 per cent. Yates reports 2 cases in which operation was performed by Ochsner. One was a round-cell sarcoma of the greater curvature and posterior wall, which required resection of the pylorus and part of the fundus, with gastro-enterostomy. The patient died twenty-seven days after operation, apparently from exhaustion. The other case was a spindle-cell sarcoma of the posterior wall. This patient was in excellent health seventeen months after resection of the affected area.

THE SMALL INTESTINE.

The Mechanism of Subcutaneous Rupture of the Intestine. Andrews² reports 5 cases of subcutaneous rupture of the intestine in which he was

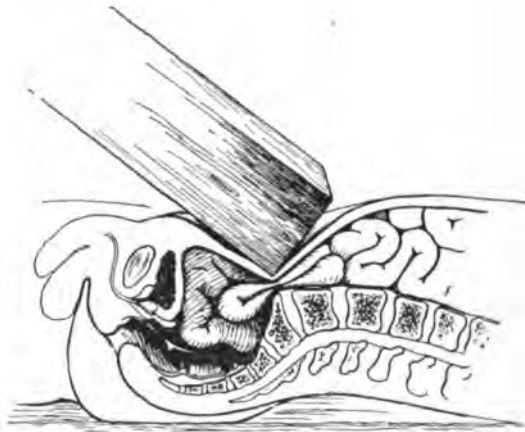


Fig. 27.—Bowel driven upon promontory of sacrum by a timber, showing probable cutting action of this bony ridge. (Andrews.)

called to operate. All of these patients were injured in one of two ways: either the patient fell heavily, striking the front wall of his abdomen upon some hard, angular body, or else a heavy body, such as a plank, fell upon the patient while he was supine. In either case the blow was transmitted from the front through the anterior wall of the abdomen, compressing the viscera against the posterior bony wall. Andrews

¹ *Annals of Surgery*, 1906, vol. xlv, p. 599.

² *Surgery, Gynecology, and Obstetrics*, 1906, vol. ii, p. 608.

explains the injury by saying that the bowel is cut in two by the angle or promontory of the sacrum, against which it is forced when the anterior abdominal wall is pushed against the spine.

This theory is directly opposed to the idea that the intestine is burst by compression of gas or fluid within it; so that Andrews offers it, as he says, with some diffidence. He became convinced of the correctness of it during an operation for an injury of this character some years ago. The diagrammatic figure illustrates his idea of the occurrence of such an injury.

I believe that Andrews is absolutely correct in his theory, excepting that there is no reason to limit the injury to the sacrovertebral angle alone. Some eighteen months ago, in the study of injuries caused by the passage of vehicles over the human body, I became convinced that the injuries to abdominal and other viscera were caused by the crushing of the wheel against the resisting vertebral column, and that if the intestine or mesentery is caught between the wheel and the spine it is apt to be cut in two; whereas if it slips to one side it will usually escape injury.

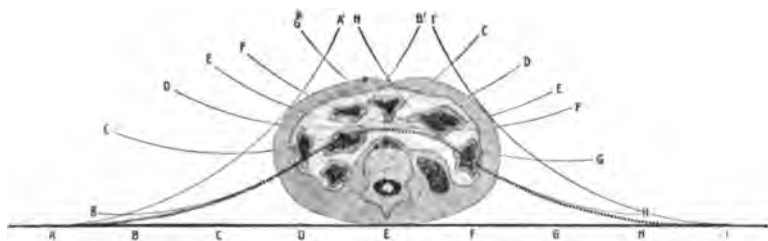


FIG. 28.—Diagram to illustrate wheel injuries of the abdomen. The solid, straight line represents the surface of the road; the curved, dotted line represents the lower level of the wheel as it passes over the body. This may be spoken of as the "dead line," since only those organs will escape injury whose motility and elasticity will allow them to be safely pressed beneath it. The lighter curved lines A-A', B-B', etc., show the positions of the wheel when its lowest point is directly over the points on the ground marked A, B, etc. (Foote.)

This further explains the high proportion of mesenteric tears and cuts in these cases, as the fixation of the mesentery makes it impossible for it to escape if the wheel passes across a certain section of the abdomen. I presented this subject to the Surgical Section of the New York Academy of Medicine at the time, but the paper has never been published. Fig. 28 is a diagrammatic representation of such injuries.

Golden¹ reports 2 cases of intestinal rupture following the crushing of the abdomen between two hard objects. One patient was operated on five hours after the accident. The omentum was torn in two; the small intestine was torn in two; the lower part of the ileum was torn from the mesentery for a distance of about six inches, and the meso-appen-

¹ *Annals of Surgery*, 1906, vol. xlv, p. 669.

dix was torn from the appendix. The appendix was removed. The other ruptures were sutured; there was almost no escaped fecal matter in the peritoneal cavity. The patient made a prompt recovery. The other patient was operated upon ten hours after his injury. Although there was only one small hole in the ileum, the peritoneal cavity was filled with intestinal contents, including many tomato seeds. This patient died of peritonitis about forty-two hours later. In both cases the abdominal cavity was freely flushed with salt solution. In the second case, owing to the escape of intestinal contents and the greater elapsed time, peritonitis was present at the time of operation. Golden lays stress upon rigidity and pain as the two most reliable symptoms pointing to rupture of the intestine in cases of blunt abdominal injury.

Extravasation in Duodenal Perforation. Smith¹ points out that extravasated fluid in the case of duodenal perforation is frequently limited to the right renal pouch, and that it may extend along the outside of the colon to the cecum without overflowing into the pelvis. If an abscess forms as a result of perforation in the first portion of the duodenum, this is also in the right renal pouch. This flow of the fluid he has confirmed by experiment upon the cadaver and finds that it holds true both for the erect position as well as for the dorsal recumbent one. Smith gives the symptoms from which one may make an early diagnosis—so important in these cases. First a sudden severe pain, usually occurring in his cases while the patient was at work. Then follows (1) a period of collapse; (2) a latent period accentuated by the administration of morphine; (3) a period of returning symptoms, quickly emerging into (4) a period of septic peritonitis. The important early symptoms are the initial pain in the right hypochondrium followed by epigastric tenderness, with rigid abdominal muscles and shallow respiration; a rapid pulse 100 or higher, which only falls to normal in the latent period.

In 12 of Smith's 14 cases the initial pain was above the umbilicus; in 8 cases to the right of the median line. At a later examination the tenderness and pain were on the right side in 6 cases and over the whole abdomen in 7. In numerous published cases the pain and tenderness are said to have been in the region of the appendix. It is therefore very important to learn the situation of the initial pain.

Acute Invagination of the Intestine in Childhood. Klemm,² from the study of 9 operative cases, and of the literature of this subject, draws the following conclusions:

1. Diagnosis is easy; it rests upon the presence of a tumor and the passage of bloody mucus from the anus.
2. The abdomen should always be examined under full anesthesia.
3. The most important indication for treatment consists in the restoration of the circulation in the mesentery.

¹ *Lancet*, 1906, vol. i, p. 895.

² *Deutsche Zeitschrift f. Chirurgie*, 1906, vol. lxxxv, p. 369.

4. All internal remedies are useless, and should be discarded.

5. As soon as the diagnosis is made the abdomen should be opened.

Klemm was able to save 3 of the 9 patients operated upon. The period of strangulation varied from ten to fifty hours except in one instance, when it had existed for five days.

Differential Diagnosis of Acute Intestinal Obstruction. Heaton¹ gives six symptoms of acute intestinal obstruction:

1. Sudden violent abdominal pain, usually at the umbilicus or epigastrium. The pain is usually colicky, subject to violent exacerbations, and relieved by pressure.

2. Collapse accompanies the onset of the pain, with pallor of the face and extremities, and a small, thready pulse.

3. Vomiting at first of gastric contents, gradually becoming stercoraceous in character.

4. Absolute constipation.

5. Subnormal temperature until peritonitis supervenes.

6. The abdomen is at first soft and flaccid, but later becomes distended and tympanitic.

He mentions eight conditions which may closely simulate acute intestinal obstruction. They are:

1. Biliary or renal colic.

2. Perforative peritonitis, due to the rupture of a gastric or duodenal ulcer.

3. Gangrenous appendicitis, or the rupture of an appendical abscess.

4. Tuberculous peritonitis.

5. Acute hemorrhagic peritonitis.

6. Torsion of an undescended testicle or of an ovarian cyst.

7. Rupture of an ectopic gestation sac.

8. Embolism or thrombosis of the superior mesenteric vessels.

The Treatment of Ileus. Offergeld² has made a critical and experimental study of ileus. He finds that the tympanites is favorably affected by eserine, nicotine, strychnine, and pilocarpine, provided there is no peritonitis. If this exists, the increased peristalsis due to these drugs may spread the inflammation or produce perforation. If the peritonitis is marked, the muscles will not respond at all to medication.

In uncomplicated postoperative ileus, due to paralysis of the intestine, nicotine, physostigmine, strychnine, pilocarpine, or barium chloride are recommended as prophylactics. Even if paralysis is present, one or more of them may be tried. If there is no effect the abdomen should be reopened.

If there is uncomplicated postoperative ileus of a dynamic character, atropine or scopolamine or homatropine is indicated. If there is no result within a short time, laparotomy should be performed.

¹ British Medical Journal, 1906, vol. i, p. 364.

² Archiv f. klinische Chirurgie, 1906, vol. lxxix, p. 810.

If the postoperative ileus is due to strangulation, medicine is of no avail, as a prompt laparotomy alone can save the patient.

Peritoneal adhesions are not directly affected by any known drugs. Eserine, nicotine, and barium chloride may be used as prophylactics.

Mercury is without effect in all the forms of postoperative ileus. Physostigmine, nicotine, and strychnine produce about the same result. Nicotine is extremely poisonous; pilocarpine is less powerful, but produces profuse perspiration; barium chloride is less powerful still, but it is not poisonous; homatropine and scopolamine have an action similar to atropine, but the dose is greater, and it is easier to produce toxic symptoms by their use. Should any such symptoms arise after the administration of any of the alkaloids, a large saline infusion should be employed to hasten their elimination.

Lennander¹ reports a case of volvulus of the whole small intestine, the mesenteric twist being in the opposite direction to that of the hands of a watch. From the study of this case and one of volvulus of the lower jejunum and ileum, the following conclusions are drawn:

If the stomach or the bowel has been distended to a certain degree—*i. e.*, if the muscular coat has been stretched beyond a certain limit—these organs are unable to contract until they have been partially emptied.

2. At the operation the highly distended but not paralyzed bowel looks as if it were paralyzed, but if emptied of a part of its contents by means of enterotomy it soon begins to contract and is afterward able to empty the rest of its contents through a fistula.

3. The paralyzed bowel does not again contract even after having been emptied of its contents.

4. If one wishes to bring about the recovery of a paralyzed portion of intestine by enterostomy, the fistula must be placed above the paralyzed part of the intestine.

5. As in many cases the paralysis also includes the uppermost portion of the jejunum, and probably also the duodenum below the papilla of Vater, there is in these cases no other way than to make a fistula (gastrostomy) in the pyloric portion of the stomach.

If at an operation one has emptied the contents of the small intestine, and in spite of this the jejunum shows no signs of contraction, gastrostomy should at once be performed.

7. If in a case where no indication for primary gastrostomy is found the size of the abdomen increases, the frequency of the pulse rises or remains high, and two or three irrigations of the stomach show retention of foul-smelling or stagnant fluid, then there should be no delay in performing gastrostomy.

Results of Operation for Acute Intestinal Obstruction. Rubritius² reports upon 91 cases of acute intestinal obstruction which have occurred

¹ Edinburgh Medical Journal, 1907, vol. xxi, p. 19.

² Beit. zur klin. Chirurgie, 1906, vol. lii, p. 405.

at the Prague Clinic since 1895, not counting strangulated hernia nor rectal carcinoma. In one group he places cases of internal incarceration due to strangulation by bands and diverticula, and cases of volvulus and of invagination; and in the other group cases of kinks from adhesions, cases of stenosis due to scars and tumors, of fecal impaction, of compression by tumors, and of spastic intestinal contractures.

There were 2 cases of internal strangulated hernia, 1 omental, and 1 diaphragmatic. There were 20 cases of strangulation from abnormal bands and adhesions following appendical or other inflammation, or laparotomy for various causes. Only 6 of these patients recovered, and of these 6 3 had symptoms of strangulation for not more than twenty-four hours, showing how bad is the prognosis when operation is delayed. The mortality was 40 per cent. of the twenty-four-hour cases and 80 per cent. of the cases above twenty-four hours.

Braun and Hofmeister advocate an enterostomy in these cases for the purpose of emptying the paralyzed bowel after obstruction has been relieved. Rubritius approves of this especially in long-standing cases.

There were 13 cases of volvulus, 9 of the small intestine and 4 of the sigmoid. In 1 of the former it was necessary to resect 215 cm. (85 inches) of small intestine on account of gangrene. The patient recovered. Dreesmann has successfully resected a similar amount and Gobell even more, namely, 3 meters (119 inches). Of these 9 patients 5 recovered. Of the 4 patients having volvulus of the sigmoid only 1 recovered. There was an interesting complication in the convalescence of this patient. To prevent recurrence of the volvulus the sigmoid was stitched to the abdominal wall. Three months later the patient, a woman, was again seized with symptoms of obstruction, and it was supposed that the volvulus had recurred; but when the abdomen was opened a perforated appendix with abscess was found. The sigmoid was in good condition and firmly attached where it had been sutured.

In another case after untwisting the sigmoid and emptying it by a rubber tube passed per rectum, an anastomosis was made between the two portions of the sigmoid to prevent recurrence. The patient died in two days, so that the efficacy of this procedure, as a means of preventing recurrence, was not put to the test. The other 2 patients died; 1 had at operation peritonitis set up by perforation of the greatly dilated cecum. The obstruction in the fourth case was wrongly attributed to cancer of the sigmoid and an artificial anus was established in the involved loop and naturally failed to give relief; 2 patients were operated upon for invagination, of whom 1 recovered.

There were 12 cases of kink from adhesions, due to previous inflammation or operation. All were treated by laparotomy. In 5 cases the adhesions were simply divided. In 2 cases the offending appendix was also removed. In 3 cases a portion of small intestine was resected.

In 2 cases an entero-anastomosis was performed. In 2 cases the obstruction could not be overcome, and a fecal fistula was established.

The results in these and the other cases of obstruction are shown in the following table:

OBSTRUCTIVE ILEUS.

Causes of obstruction.	No. of cases.	Recovered.	Died.
Peritoneal adhesions	12	7	5
Meckel's diverticulum	1	1	
Cicatricial stenosis	5	4	1
Carcinoma	27	14	13
Compression of intestine	3	2	1
Fecal impaction	1	1	
Spastic contracture	3	2	1
Unknown	2	2	
Totals	54	33	21
Cases of strangulated ileus	37	15	22
Totals	91	48	43

In the after-treatment of these patients Rubritius recommends subcutaneous or intravenous saline infusion; also, in all cases in which the intestinal wall was intact, high colonic irrigation was promptly instituted. He also speaks well of the subcutaneous use of physostigmine in doses of 1 to 2 mg. ($\frac{1}{80}$ to $\frac{1}{30}$ grain) in such cases.

The following table will show at a glance the results obtained by a number of experienced operators, in the past twelve or fifteen years, in the operative treatment of ileus:

Author and year of publication	No. of operations.	No. of recoveries.	Per cent.
Obalinski, 1894	110	38	34.5
Heidenhain, 1897	30	14	46.6
Kocher, 1899	78	56	71.7
A. v. Bergmann, 1900	66	15	22.7
v. Mikulicz, 1900	70	34	48.5
Prutz, 1900	36	19	52.7
Zeidler, 1900	17	8	47.0
Hepner, 1902	31	15	48.5
Philipowicz, 1903	67	25	37.3
Ranzi, 1904	37	15	42.1
W. Braun, 1904	29	17	58.6
O. Simon, 1905	51	21	41.0
Göbell, 1906	54	26	48.1
Rubritius, 1906	91	48	52.7

Carcinoma of Small Intestine. Carcinoma of the small intestine is extremely rare. Maydl and Nothnagel found 343 cases of intestinal carcinoma in 41,838 autopsies. They were distributed as follows: duodenum, 7 cases; jejunum, none; ileum, 10 cases; cecum and colon, 164 cases, and rectum, 162 cases. Kanzler was able to find only 25 records of clinical cases of carcinoma of the jejunum and ileum. Only

5 of these patients were in condition to warrant the radical removal of the tumor. It is therefore remarkable that Finsterer¹ is able to report 2 cases in which the movable tumor warranted attempts at a permanent cure. In 1 case the carcinoma was of the ileum and the other of the jejunum, both near the middle of the small intestine.

The first patient, aged sixty-eight, was operated upon to relieve stenosis. Enlarged glands were plainly felt when the abdomen was open. The tumor was removed and a circular enterorrhaphy performed. One end of the bowel was imperfectly supplied with blood and necrosis resulted, allowing leakage and fatal peritonitis. The other patient was a man aged forty-five years. His tumor was not so far advanced and no enlarged glands could be found. The circular enterorrhaphy healed



FIG. 29.—Carcinoma of the ileum.



FIG. 30.—Carcinoma of the jejunum.

satisfactorily, and the patient did well for eight months. Then symptoms of rectal tumor developed. The abdomen was opened, but the metastatic growths in the pelvis were too extensive to warrant anything more than a colostomy. The bladder became involved and death resulted seventeen months after the first operation. The specimens in these 2 rare cases are shown in Figs. 29 and 30.

The prognosis in carcinoma of the small intestine is very bad indeed, partly perhaps because the diagnosis has always been made so late in the disease. In the absence of definite symptoms this seems almost unavoidable. In 2 cases here mentioned no tumor could be felt. Pain and vomiting without fever, were symptoms common to both patients; one had fecal vomiting and diarrhea and the other was

¹ *Deutsche Zeitschrift f. Chirurgie*, 1906, vol. lxxxiii, p. 567.

constipated. There are on record 5 other radical removals of carcinoma of the small intestine: 4 of the patients died from the operation or from recurrence; a fifth died a year later from pneumonia following a reopening of the abdomen to ascertain the origin of new symptoms of stenosis. There was no evidence of recurrence of the growth, nor of metastases.

Capillarity in Intestinal Sutures. This is a subject which has often been spoken of, but upon which there is little positive information. Connell¹ to meet this lack of knowledge has conducted a number of experiments in the laboratory and upon animals. He finds that twisted silk has the greatest capillarity; linen and braided silk have much less, while Pagenstecher thread and catgut have still less. While the capillarity was considerable for an aqueous solution of methylene blue, the capillarity for intestinal contents was considerably less. When a suture was passed directly through a loop of bowel afterward filled with methylene-blue solution and left for fifteen minutes, it was found that the bowel wall effectually prevented the spread of the fluid within its lumen to the portion of the suture outside of it. This was true in all experiments for both braided and twisted silk and Pagenstecher thread.

These experiments show that the fear of capillarity in through-and-through intestinal sutures is pretty nearly groundless, and methods of suturing depending upon a through-and-through stitch are becoming more and more popular. They have, of course, a greater firmness than any method in which the stitch includes only a portion of the intestinal wall. It should, however, be borne in mind that capillarity is only one of the objections which have been made to a through-and-through stitch, the other objection being that as the needle and thread pass into the lumen and out again bacteria may find lodgment in the thread, and so be carried from the lumen of the intestines into the peritoneal cavity. That this risk is a slight one when the portion of bowel sutured is clean, clinical results very plainly show.

The Appendix. EARLY SYMPTOMS OF APPENDICITIS. Pond,² in speaking of the early symptoms of appendicitis, says that pain is the first and the most important, followed closely by nausea and vomiting; the increased pulse rate and rise in temperature are evident in exact proportion to the pathological progress in the appendix or peritoneum; the rigidity of the abdominal wall follows this damage and is nature's attempt to protect a peritoneum that either has already become inflamed or is rapidly becoming so. He insists that the proper importance be put upon these symptoms, irrespective of the time of their occurrence, when deciding upon the proper treatment.

AN UNUSUAL FOREIGN BODY IN THE APPENDIX. Denenholz³ removed the inflamed appendix of a boy aged seven, and found that the perforation

¹ Journal American Medical Association, 1906, vol. xlvii, p. 405.

² Medical Record, 1906, vol. lxx, p. 696.

³ New York Medical Journal, 1906, vol. lxxxiv, p. 1087.

in it had been caused by a small piece of wire such as is used in the making of artificial flowers. Several members of the boy's family employed such wire for the purpose indicated, in the rooms where they prepared and ate their food.

PERFORATION OF THE APPENDIX BY A FISHBONE. Jackson¹ operated upon a young man one day after the occurrence of acute abdominal symptoms, the diagnosis being exacerbation of a chronic appendicitis. The peritoneal cavity contained a large amount of bloody serum. The appendix at its junction with the cecum had been perforated by a fishbone about an inch long. Recovery was uneventful. The patient had had for a year and a half several attacks of pain sufficiently severe to make him stop work for a day or so at a time.

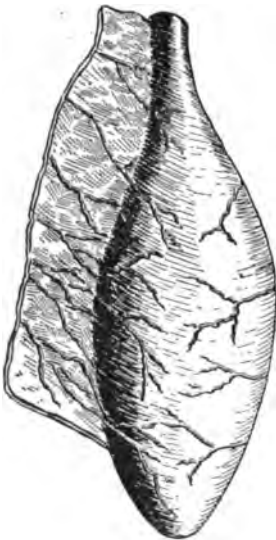


FIG. 31.—The appendix as it appeared fully distended, before it had emptied itself.

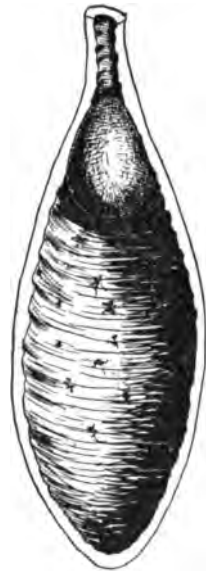


FIG. 32.—Longitudinal section with concretion *in situ*.

PYOPNEUMO-APPENDIX. Porter² cites an interesting and unusual case of appendicitis, in which the appendix was found to contain a fecal concretion about the size and shape of a robin's egg and a considerable quantity of pus and gas. The concretion acted as a ball valve. Manipulation of the acutely inflamed appendix during the operation permitted some of this gas to escape into the cecum with a gurgle. The operator not unnaturally thought that he had ruptured the appendix, but further examination proved it to be intact. The accompanying drawings (Figs. 31 and 32) were made from the fresh organ after removal.

¹ Medical Record, 1906, vol. lxx, p. 616

² Journal of the American Medical Association, 1906, vol. xlvii, p. 435

GANGRENE OF THE APPENDIX AND APPENDICITIS. Malcolm¹ suggests that gangrene of the appendix may be a distinct disease and occur independently of appendicitis. This would explain, he says, the cases which operated on within three or six hours of the first symptoms, present an appendix having one or more gangrenous patches in its wall, the rest of the appendix not showing marked change. He fails to suggest the cause of the gangrene.

TYPHOID INFECTION OF THE APPENDIX. The question as to operation for appendicitis during typhoid fever is still an unsettled one, although removal of the appendix during typhoid fever, before it has perforated, has usually been followed by recovery. Austin² reports a case in which the appendix was removed on the seventh day of the disease while the diagnosis of typhoid was still in doubt. There was intense pain, but very little rigidity. When the abdomen was opened it was seen that the ileum, cecum, and appendix were all much congested, and it was the belief of the operator that the appendix would have perforated within twenty-four hours. Following the operation the pain ceased, the abdominal wound closed primarily, and the typhoid fever ran its usual course.

Austin narrates another case in which he was called to see a patient in the third week of typhoid fever who had suddenly developed acute pain on the right side. There was considerable tympany and extreme tenderness. Careful auscultation revealed the fact that gas periodically accumulated in the lower part of the ileum, and on its discharge through the ileocecal valve produced excruciating pain. The pain was therefore thought to be due to ulcer and not to perforation. By high colonic irrigation and turpentine stupes the tympany and pain were relieved. Auscultation of the abdomen, which proved such a reliable guide in this case, is a means of examination too often neglected in abdominal diagnosis.

APPENDICITIS IN INFANTS. Kirmisson and Gymbellot³ report the occurrence of appendicitis in an infant aged eleven months, and 25 other cases which they have collected from literature, both European and American: 9 of these cases occurred in the first year of life and 17 in the second year; the attacks in the first year were invariably fatal; 7 of these 9 patients were operated upon. In the second year there were 17 deaths and 7 recoveries: 12 of these patients were operated upon; 7 recovered and 5 died. These authors conclude that appendicitis in infancy is less rare than is generally supposed, that the diagnosis is very difficult, that the prognosis, especially in the first year, is extremely grave, and that the only treatment worth considering is immediate operation.

¹ *Lancet*, 1906, vol. ii, p. 213.

² *New York Medical Journal*, 1906, vol. lxxxiv, 425.

³ *Revue de chirurgie*, 1906, vol. xxxiv, p. 441.

DELAY IN OPERATION FOR APPENDICITIS. If an excuse is needed for publication of articles upon appendicitis, when so much has already been written upon this subject, it is found in the statement of Coffey¹ that in fully one-half the cases of appendicitis referred to him by other physicians the diagnosis has not been made before the end of the third day, with any degree of positiveness. He refers to the Ochsner treatment as "first aid to the injured," only to be recommended in the absence of a competent surgeon. He says that almost all the deaths in the hands of well-trained abdominal surgeons are the result of (1) the family physician failing to recognize the disease early; (2) the family physician temporizing with medication or the Ochsner treatment; (3) the inability of the family physician to procure a competent surgeon early; (4) the opposition of the members of the family to surgical treatment.

WHEN TO OPERATE IN APPENDICITIS. Marshall and Quick² make a brief report of the results in 100 consecutive laparotomies performed by them, 39 of which were for appendicitis, either acute or chronic. They have no hesitation in declaring themselves for operation in appendicitis as soon as a positive diagnosis is made; with one exception, *i.e.*, when a patient is seen for the first time, and is satisfactorily recovering from a catarrhal attack. By operation they mean the least possible procedure compatible with the interests of the patient. For instance, in suppurative cases, as soon as the peritoneum is opened and pus is found, a large tube is inserted and further operation is immediately abandoned and free drainage is established, even if there is an excess of peritoneal fluid turbid in character, with a few flakes of fibrin on the presenting loops of intestine. These operations require but a few minutes and in no case militate against the patient's chances of recovery. How can they? Has anyone ever doubted the ancient dictum, "Where there is pus evacuate?" Is there anything sacred about a suppurating peritoneum? and is not this structure subject to the same laws of physiology and pathological physiology as are the pluræ, the liver, and the large joints? Whenever a patient has an acute suppurative infection of the peritoneum open the cavity instant; but once it is opened, beware of pernicious activity.

WHEN NOT TO OPERATE. Brownson³ says that his rule is to operate in the primary period, in the abscess period, and in the interval period; but not to operate in the intermediary period, because the risk of perforation of the appendix is less than the risk of operation at this period.

The opposite view is clearly stated by Ward,⁴ who says that surgeons are gradually losing their fear of spreading septic fluids through the peritoneal cavity, and are learning to operate at once in appendicitis,

¹ New York Medical Journal, 1906, vol. lxxxiv, p. 325.

² Medical Record, 1906, vol. lxx, p. 809.

³ Ibid., p. 535.

⁴ New York Medical Journal, 1906, vol. lxxxiv, p. 937.

whether it is the first day, the third day, the fifth day, or later; whether there is pus present or not; and whether the wall of limiting adhesions is present or not.

Peck¹ gives a *resume* of 36 cases of acute appendicitis, and says that immediate operation is preferable to delay in all cases of severe appendicitis, of whatever type. In his judgment abundant saline irrigation is the most rapid and satisfactory method of removing infective material

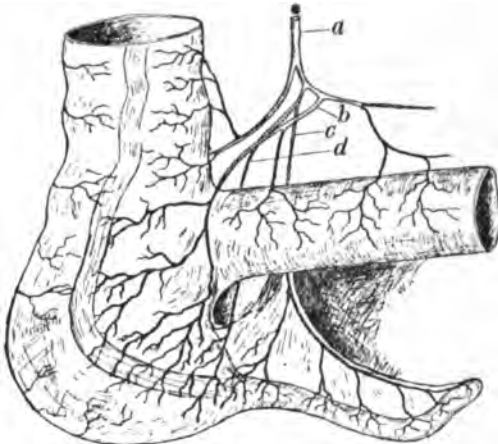


FIG. 33.—The ileocolic artery (a) gives off a branch to the ascending colon and an anterior and posterior cecal artery (d). The appendical artery (c) arises in this figure from the posterior cecal artery. It passes behind the ileum to the free border of the meso-appendix, where it gives off five (sometimes more) branches. (Hessert.)

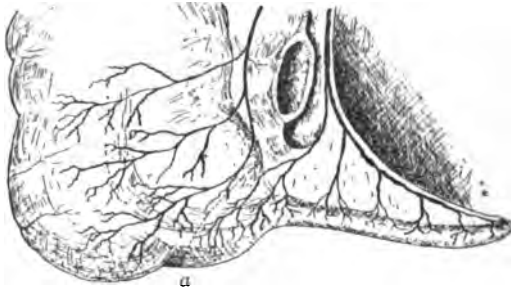


FIG. 34.—Type 1. Sixty-two per cent. of all subjects. Dotted line (a) indicates the division between the cecal and appendical vessels. (Hessert.)

in cases of spreading peritonitis. Drainage should be limited to abscess cavities, and to the region of the stump in cases in which a clean inversion with complete removal of necrotic material is not obtainable.

HEMORRHAGE AFTER APPENDECTOMY. Hessert² reports 3 cases of hemorrhage from the stump following appendectomy. In one

¹ Surgery, Gynecology, and Obstetrics, 1906, vol. ii, p. 555.

² Journal of the American Medical Association, 1906, vol. xlvii, p. 2009.

instance the hemorrhage resulted fatally. In every case the hemorrhage was into the cecum, the bleeding occurring from a vessel in the inverted stump. Figs. 33 to 36 show the arterial blood supply of the cecum and appendix. Hessert's technique had been to clamp the appendix at its base, cut off the distal portion flush with the forceps, insert a purse string around the base, release the forceps, invert the stump, and tie the suture. No hemorrhage would be likely to follow in the types shown in Figs. 31 and 32. It might do so in type 3, Fig. 35. He now advises a safer plan, namely, the division of the appendix with the cautery. If

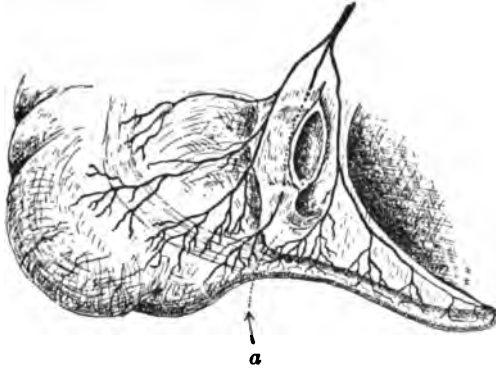


FIG. 35.—Type 3. Five per cent. of all subjects. Line of division (a) well out on appendix. Cecal vessels supply base of appendix. This is the type where the stump may bleed unless ligated or cauterized. (Hessert.)

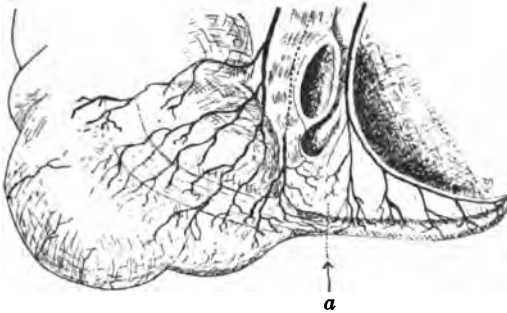


FIG. 36.—Type 4. Thirty-two per cent. of all subjects. Dotted line (a) indicates line of division between circulation of cecum and appendix. (Hessert.)

this is not at hand the appendix should be grasped at its base by strong forceps and thoroughly crushed. After removal of the forceps a ligature is applied around the crushed portion and the appendix distal to it is cut away. The stump is sterilized with carbolic acid and buried by Lembert sutures.

APPENDECTOMY COMPLICATED WITH JAUNDICE. Reichel¹ has noted jaundice as a postoperative complication of appendicitis 18 times in

¹ Deutsche Zeitschrift f. Chirurgie, 1906, vol. lxxxiii, p. 1.

165 cases: 10 of these 18 patients died; so that he looks upon the complication as a serious one. The jaundice, at least in nearly every case, was not due to swelling of the mucous membrane above the papilla in the duodenum, but was a symptom of a general septic infection. The usual course of the disease was as follows: The appendicitis was acute and the operation was not difficult. For twenty-four hours afterward all the symptoms were favorable. During the second or third day slight jaundice was noticeable, usually accompanied with restlessness, sleeplessness, and disturbed mental action. The pulse became rapid, while the temperature was normal or only slightly raised. In favorable cases these symptoms speedily subsided; in the fatal cases they rapidly increased, the patient became delirious, then comatose, and died in one or two days. It was noticeable that the usual signs of peritonitis were absent. These symptoms somewhat resemble those due to iodoform poisoning, but in some of the cases no iodoform was used. One of his case reports is so instructive that it is worth repeating:

A girl, aged nine years, had an attack of tonsillitis. The symptoms improved slightly, but on the fifth day she had a chill and a temperature of 104° F. The right tonsil was much enlarged, but was free from membrane. On the following day she complained of pain in the right side of the abdomen. The day after that her appendix was removed. It was surrounded by adherent omentum. It had not perforated, but there was commencing gangrene of the mucous membrane only. The stump was buried and an iodoform-gauze drain was inserted. That evening the patient was comfortable, the urine was passed voluntarily, the temperature was 100.4°, and the pulse 106. On the following morning the condition was about the same. By noon restlessness and some pain were noted; the temperature was normal, but the pulse 120. During the afternoon the patient became delirious, and jaundice appeared. By evening the patient was comatose, the pulse was 120, the temperature 102°. The dressing was changed; there was no discharge, the appearance of the wound was perfect, and the abdomen was soft. The patient died the following morning, less than forty-eight hours after the operation. There was no pus anywhere in the peritoneal cavity, and no thrombosis of the mesenteric veins. There were multiple small hemorrhages in the stomach, the spleen was large and soft, and there were other evidences of a general sepsis. Cultures were made from the upper portion of the peritoneal cavity, from the pelvis, from the blood of the portal vein, from the lymph vessels of the excised appendix, and from the kidneys. Every one of the cultures showed an abundant growth of streptococci.

Jaundice may follow other abdominal operations. Thus Campora¹ reports 4 cases of *postoperative icterus* following the fixation of the

¹ *Gazzetta degli Ospedali*, 1906, vol. xxvii, No. 51.

kidney (1 case) and double inguinal herniotomy (3 cases). There was little loss of blood in any one of these operations. The anesthetic was chloroform, and the icterus was attributed to the action of this drug on a not very healthy liver. Three of the patients gave a history of alcoholism. One of them died after very intense icterus, edema, low delirium, and coma. The others recovered.

I have recently experienced postoperative icterus of a mild character occurring the second day after the administration of chloroform for about ninety minutes for removal of a chronically inflamed appendix and plastic work in the pelvis. There was little hemorrhage, and the patient was a non-alcoholic young woman. The icterus was accompanied by nausea and headache. It did not materially retard the convalescence. The wound healed primarily, and there was no fever following operation.

PELVIC LESIONS COMPLICATING APPENDICITIS. Schmidt¹ mentions some of the complications introduced into appendicitis by diseases in the pelvis, such as the following:

1. The adnexa are the primary seat of the inflammatory changes; the appendix is passively involved, and bound by adhesions to the surrounding parts. Inflammatory action is principally manifested in thickening of the peritoneum and the tubal wall, *i. e.*, peri-appendicitis.

2. The appendix is primarily affected; the changes of the adnexa are of secondary nature—perisalpingitis.

3. In the course of a chronic salpingo-oöphoritis with pelviperitonitis, a genuine appendicitis may develop.

The chief difficulties in diagnosis are found in cases of the third class. In appendicitis rigidity of the abdominal muscles on the right side is noticeable; anomalies in menstruation point to a pelvic derangement. At operation, if the appendix, ovary, Fallopian tube, and omentum be matted together, the condition of the mucous membrane of the appendix or of the Fallopian tube may determine the primary character of the disease; thus, if the mucous membrane of the appendix be intact and peri-appendicitis be present, one may safely assume that the irritation was external to it. A similar statement is true in regard to salpingitis.

APPENDECTOMY AND HERNIOTOMY COMBINED. Torek² exposes the aponeurosis of the external oblique muscle, and divides it downward in the direction of its fibers from the usual site of the incision for appendectomy to the external ring. The aponeurosis of the external oblique is dissected up so as to expose the internal oblique and Poupart's ligament. The hernial sac is freed, ligated, and cut off. Next, the fibers of the internal oblique and transversalis are separated bluntly in the usual manner, the peritoneum is opened, the appendix removed; then

¹ New York Medical Journal, 1906, vol. lxxxiv, p. 126.

² Annals of Surgery 1906, vol. xliii, p. 665.

the peritoneum, transversalis fascia, and muscles are closed again; in a word, the appendicitis operation is completed, except that the aponeurosis of the external oblique is still left open. The hernia operation is then completed.

FALSE DIVERTICULA OF THE APPENDIX. Seelig¹ calls attention to false diverticula of the appendix—little hernias, so to speak, of the mucous and peritoneal coats through gaps in the muscular structure, which are oftenest seen along the mesenteric border, but may occur elsewhere. He believes that such diverticula are formed at points where the muscular coat has been destroyed by previous inflammation and has been replaced by yielding scar tissue. The clinical significance of a diverticulum lies in the fact that it invites perforation, since it is a thin-walled sac without muscular tissue, connected with the lumen of the appendix through a narrow mouth liable to be closed in the very beginning of inflammation.

Seelig believes that on this account any appendix which has a diverticulum should be removed.

POLYPI OF THE APPENDIX. Pressly² operated upon a boy aged nineteen two months after his fourth attack of appendicitis. The organ was



FIG. 37.—Appendix with two polypi, everted on the blade of an artery forceps; natural size. (Pressly.)

much distended with liquid feces thought to be pus until the eversion of the appendix showed that it contained two polypi, one of which, acting as a ball valve, had prevented the escape of the fecal matter. The mucous membrane was thickened with several eroded pits.

MALIGNANT GROWTHS OF THE APPENDIX. Rolleston and Jones³ have collected reports of 42 cases in which the diagnosis was verified by the microscope, as follows: carcinoma, 37 cases; endothelioma, 3 cases; sarcoma, 2 cases. None of the cases were correctly diagnosed before operation. In most cases the tumor was confined to the appendix; so that the almost invariable absence of recurrence after removal is not surprising.

¹ *Annals of Surgery*, 1906, vol. xlv, p. 78.

² *Journal of the American Medical Association*, 1906, vol. xlvii, p. 359.

³ *Lancet*, 1906, vol. i, p. 1525.

APPENDICOSTOMY. This operation, which was first performed by Weir in 1902, as a substitute for cecostomy, has become so popular that Tuttle¹ has been able to collect reports of 77 cases in which it was performed. He himself has performed it fourteen times. His technique is as follows: An intermuscular incision is made directly over the lower end of the cecum. The appendix is grasped and brought up into the wound, the artery of the mesentery is tied, and the mesentery stripped from the appendix down to its junction with the cecum; the latter is then fastened to the parietal peritoneum at the lower angle of the wound by sutures on either side and above the appendix, the last suture being continued to close up the peritoneal wound. One should avoid involving the lesser appendical artery in the side sutures. The muscular and fascial layers are then closed by sutures of chromicized catgut; the appendix itself is fastened in the lower angle of the skin wound by a suture on either side, and the skin wound is finally brought together by plain catgut sutures.

The protruding appendix is wrapped with gutta-percha tissue and the abdominal wound is then sealed either by collodion or by gutta-percha tissue and chloroform. At the end of two days the dressing around the appendix is removed, and if the organ is found gangrenous at its tip, as it frequently is, it should be cut off about one-fourth to three-eighths of an inch from the skin. If the aperture appears small the tract should be followed by a probe at once and then dilated by some such instrument as a conical bougie or Earle forceps, after which a properly adjusted catheter should be introduced and a ligature tied around the stump of the appendix, which will serve the double purpose of preventing leakage around the catheter and at the same time cut off the stump of the appendix flush with the skin. The catheter should be introduced about two to four inches, according to the thickness of the abdominal wall, and should protrude about four inches. If there is abdominal distention its end should be left open in order to allow the escape of gases; if there is none, it should be bent on itself and fastened with a safety pin to avoid leakage into the dressings. On the third or fourth day irrigation may be begun, using at first warm saline solutions until the bowels have been freely opened.

The conditions for which operation was performed were as follows: amebic colitis, 45; mucous colitis, 15; syphilitic ulceration of colon, 4; tuberculous ulceration of colon, 4; multiple papilloma, 2; intussusception, 1; volvulus, 1; chronic constipation, 2; carcinoma of transverse colon, 1; hemorrhagic colitis, 1; in resection of ileum as precaution against gaseous distention, 1.

In the 45 cases of *dysentery* there were 6 deaths following but not due to the operation, 2 from unsuspected tuberculosis, 2 from extensive ulceration of bowel with chronic nephritis, 1 from exhaustion

¹ Journal of the American Medical Association, 1906, vol. xlvii, p. 426.

before the appendix was opened, and 1 from cerebral disease three months after the operation, the dysentery having been apparently cured for two months. The remaining 38 patients are reported cured. Two relapses are reported, one after two years. In the cases of papilloma the operation was only palliative; this was also the case in carcinoma. The cases of syphilitic ulceration appear to have been greatly benefited, if not permanently cured. In the cases of volvulus and intussusception the operation was effectual. In the cases of mucous colitis the reports are all favorable. In these, however, we must consider how much was due to the removal of the appendix and how much to the effects of the appendicostomy. The relationship between chronic appendicitis with adhesions and chronic mucomembranous colitis is a very close one and the etiological influence on one or the other merits a wider discussion than our space will permit. Suffice it to say that by appendicostomy we accomplish the double purpose of getting rid of the appendix, whether it be the cause or effect of colitis, and at the same time give access to the parts for local treatment.

The selection of a fluid for irrigation will depend on the diseased condition. In amebic colitis solutions of quinine have a great reputation. Tuttle has found a normal saline solution at a temperature of 65° to 75° to be even more effective. In catarrhal conditions, with or without ulceration, the following solutions may be employed: nitrate of silver, 1 to 5000; ichthyol, 1 to 200; argyrol, 5 to 25 per cent.; peroxide of hydrogen, 10 to 20 per cent.; aqueous fluid extract of *krameria*, 10 per cent.

Gant¹ makes use of a similar technique. Through a gridiron incision he frees the appendix if adherent, and brings it out of the wound; opens it and passes a probe to determine its patency. If the appendix is strictured or otherwise unsuitable, it is amputated and cecostomy is performed. Otherwise the cecum is sutured to the abdominal wall, the appendix is ligated, cauterized and anchored to the skin. It makes no difference whether the meso-appendix is divided or not. About the fourth day the portion of appendix distal to the ligature sloughs. Irrigations are begun immediately. The quantity of fluid used should be sufficient to thoroughly cleanse the bowel. Whether or not it is a medicated fluid seems to make no difference. Gant reports 8 cases of appendicostomy and 1 case of cecostomy. The only complication was nausea in 1 case due to the inclusion of a part of the cecum in the wound. The appendix was kept open from three to twelve months. In some instances it closed spontaneously; in others cauterization of the mucous membrane was necessary.

THE APPENDIX AS AN ARTIFICIAL ANUS. Keetley² has found a new use for the appendix. A malignant growth had obstructed the trans-

¹ Boston Medical and Surgical Journal, 1906, vol. clv, p. 258.

² Lancet, 1906, vol. i, p. 1023.

verse colon and there was other evidence of carcinoma in the abdomen. The rather small appendix was brought into the wound and sutured. On the following day it was dilated until a rectal tube could be passed and for three months the feces passed through it.

Mounsell,¹ in operating upon a woman aged seventy-seven, found that intestinal obstruction was due to a volvulus of the cecum and a part of the ascending colon, which had a complete meson. Fearing recurrence he determined upon appendicostomy as a method of fixing and draining the cecum. When the fistula was no longer needed he closed it by dissection of the mucous membrane only, which he found very easy to perform.

The list of diseases in which appendicostomy has been recommended is now quite long: (1) Mucous colitis. (2) Dysentery. (3) Chronic ulceration of the colon. (4) Chronic constipation. (5) To fix and drain an ileocecal intussusception. (6) To drain and prevent distention subsequent to operations for obstruction. (7) To prevent recurrent volvulus of the cecum. (8) In enteric fever to permit of local treatment. (9) As a substitute for rectal feeding. (10) As a substitute for gastrostomy or jejunostomy in very feeble patients.

THE LARGE INTESTINE.

Tuberculosis of the Cecum. At the French Congress for Surgeons held in Paris October 6, 1906, Pauchet² reported upon 4 cases of tuberculosis of the cecum in which he had operated with success by one of the following three methods:

(a) Closed exclusion, which consists in the isolation of the whole or a part of the large intestine by a double implantation in the colon of the end of the ileum.

(b) Open exclusion, in which the two ends of the excluded ileocecal segment are implanted in the skin and the continuity of the intestine is reestablished.

(c) Resection of the ileocecal segment, with closure of the cut ends of the ileum and colon, followed by a lateral ileocolic anastomosis, with the aid of a Murphy button.

Ectasia of the Descending Colon and Sigmoid Flexure. Roth³ has operated in 2 cases of dilatation of the descending colon and sigmoid, a condition sometimes spoken of as Hirschsprung's disease. The origin of the trouble is generally recognized as congenital, but whether it consists in an abnormal length and dilatation of these portions of the intestine, or whether the dilatation is secondary to the formation of a valve, a kink, or a stricture, is not known. One of his patients was a boy aged three, with a history

¹ Lancet, 1906, vol. i, p. 1173.

² Rev. de chir., 1906, vol. xxxiv, p. 680.

³ Archiv f. klinische Chirurgie, 1906, vol. lxxxi, pt. ii, p. 85.

of constipation and abdominal swelling since birth. From the second year his bowels never moved oftener than once a week. Irrigations of the colon and medicines having failed to improve his condition, the abdomen was opened, but the state of the child did not permit of an extensive operation. He recovered from this exploratory operation, and went about as usual for six months. Then his strength failed and he died. The autopsy did not reveal the cause of death. The enormously distended colon and sigmoid are shown in Fig. 38.

The other patient was a boy, aged seventeen years, who gave a similar history. The abdomen was opened in the median line, and the enormously distended sigmoid was brought out of the wound. Two



FIG. 38.—Postmortem appearances in ectasia of the colon and sigmoid (Roth.)

days later it was resected and three weeks afterward the spur between the two openings was destroyed by a clamp. The patient entirely recovered.

In neither of these cases was there any kink or valve at the point where the dilated sigmoid joined the rectum. Roth calls attention to the fact that in both of these patients the bladder extended nearly to the umbilicus, a condition to be kept in mind by the operator.

Volvulus of the Sigmoid. Moschcowitz¹ reviews the various operations which have been suggested to prevent a recurrence of volvulus of the sigmoid flexure. He reports a case in which he operated for volvulus. After untwisting the bowel and emptying a large quantity of gas and fecal matter by passing a rectal tube, he stitched the sigmoid to the left

¹ New York Medical Journal, 1906, vol. lxxxiv, p. 65

half of the anterior abdominal wall for a distance of two and a half inches. Three weeks later, when the patient was about to be discharged, the abdomen again became distended and was reopened by Gerster. A number of loops of small intestine were found to be strangulated in the space to the left of the attached sigmoid. The patient did not recover from the operation. Moschcowitz has been unable to find any recorded case of this character, although the accident is one which might rather be expected to follow sigmoidopexy. In spite of this risk he regards sigmoidopexy as the best procedure to prevent recurrence of a volvulus unless the local and general conditions are such as to warrant resection. This opinion is in accord with the results obtained in a twice recurrent volvulus for which I operated some years since, stitching the sigmoid far over on the *right* side. There was no further trouble up to the death of the patient from tuberculosis five years later.¹

Angulation of Sigmoid. Laroque² made a diagnosis of incomplete intestinal obstruction in a young unmarried woman who consulted him for (1) recurrent attacks of violent abdominal pain attended with nausea, vomiting, and moderate shock, and a number of times followed by the passage of blood; (2) obstinate, almost complete constipation; (3) intestinal distention; (4) hypertrophy of the colon. A sigmoidoscope was passed sixteen inches into the rectum, though with great pain to the patient. The rectum was empty and showed no signs of disease. There was some fecal matter in the sigmoid, and what was taken to be a sessile growth projected into its lumen. The abdomen was opened, and the large intestine was found to be distended with gas and feces. The rectum was empty. The obstruction was due to angulation of the sigmoid, apparently caused by a short mesentery. So acute was this angulation that division of some of the mesenteric attachments was necessary to relieve the obstruction. No abnormality of the bowel itself could be found, and it was concluded that the supposed new-growth was merely a projecting fold of mucous membrane, this mistake being easily made under the circumstances. The patient made a prompt recovery.

Fistula of the Colon. Royster³ was operating to close a fistula in the sigmoid colon. He had freed the bowel entirely from adhesions, but was unable to find the small opening in its lumen, as the surface for quite a distance was raw and bleeding. The injection of an ounce of peroxide of hydrogen into the rectum was followed by an immediate bubbling of gas from the hole in the intestine. He promptly closed this opening with two rows of Lembert sutures. He recommends this method in similar circumstances.

¹ New York Medical Journal, 1907, vol. lxxxv, p. 619.

² Annals of Surgery, 1906, vol. xlv.

³ Journal of the American Medical Association, 1906, vol. xlvii, p. 111.

Sigmoid Pathology. Niles¹ says (1) that ulcer must of necessity be the usual primary lesion resulting from the anatomical and physiological peculiarities of the sigmoid (Fig. 39); (2) that cancer here, as in the stomach, is preceded by ulcer; (3) that ulcer is always the causative factor in annular stricture; (4) that it is the most influential factor in sigmoid angulation and one of the predisposing causes in accidental volvulus; (5) that as a consequence it is the important antecedent pathology of all malignant and most non-malignant complete and incomplete occlusions of the sigmoid.

Therefore the early recognition and rational treatment of sigmoid ulcer and its complications are worthy the most careful consideration

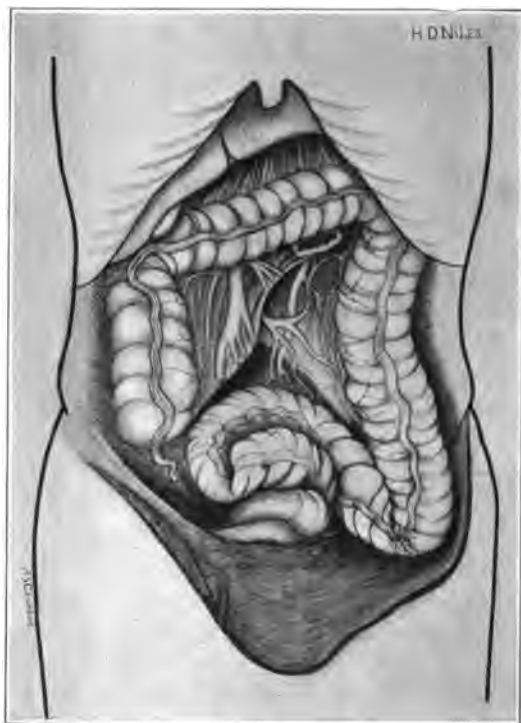


FIG. 39.—Showing commencing ulcer and angulation at proximal and distal ends of sigmoid. (Niles.)

of both internists and surgeons. A suggestive history, the exclusion of other diseases, the absence of acute inflammatory symptoms; the left-sided tenderness, either with or without inflation of the colon; the colicky pains, the presence of pus or blood in the stools, obstinate constipation or obstructive symptoms, are all suggestive of sigmoid pathology. Niles finds inspection, palpation, and percussion of the bowel before, during,

¹ Journal of the American Medical Association 1906, vol. xlvii, p. 832.

or after it is distended with air or water, to be especially helpful to a correct diagnosis. A fixed point of tenderness without stenosis indicates ulcer.

The essential principle of treatment of sigmoid ulcer is rest. This may be secured by starvation, by irrigations from below, or from above through an opening in the colon. If stenosis exists the ileum and sigmoid may be anastomosed, the ulcer excised, or the bowel resected. As we gradually learn to carry to the bedroom and consulting room a definite mental picture of the successive morbid processes in sigmoid disease, more accurate methods of diagnosis will be suggested, and more effective means of treatment will be evolved.

Tumors of the Colon. Jonas¹ reports 16 cases of tumor of the colon, nearly all malignant. While one may achieve an operative success in these cases, removing the tumor and suturing the cut ends of bowel, yet the probability of recurrence is very great, because surgeons hesitate to operate until clinical signs are positive, that is, when a tumor can be felt or obstruction has already occurred. At so late a time metastases have almost certainly taken place. Familiarity with definite and well-defined diagnostic signs have done away with a similar delay in the case of the appendix and gall-bladder. The obvious lesson is to learn the early symptoms of new-growths in the colon. The common early symptoms in Jonas' group of patients were frequently recurring colicky pains; local tenderness; abdominal fulness due to accumulations of gas; generally constipation, sometimes diarrhea. Often the digestion was undisturbed till relatively late in the disease. There is almost always a loss in weight even in the early stages.

Repeated thorough examination is desirable. The tumor can often be detected at an earlier date if several examinations are made. Auscultation will sometimes reveal the constriction by reason of the gurgling heard there when the intestinal gas passes, or when air is pumped into the rectum. When ulceration of the growth takes place the stools may contain pus, mucus, or blood, or they may be very offensive from the gangrene of the surface of the ulcer.

Inflammation of the Colon Resembling Cancer. Lambret² operated upon a patient who was pale, emaciated, and troubled with habitual constipation. He had borborygmus, colic, and a tumor with irregular nodules above the umbilicus. A diagnosis of cancer of the transverse colon was made. This diagnosis seemed to be confirmed at operation, the transverse colon being involved so extensively in a grayish-white nodular growth that it could not be brought out of the wound. An ileosigmoidostomy was therefore performed, with unilateral exclusion of the large intestine. Three weeks later the tumor had entirely dis-

¹ Journal of the American Medical Association, 1906, vol. xlvii, p. 825.

² Revue de chirurgie, 1906, vol. xxxiv, p. 680.

appeared and the patient seemed perfectly well. In the light of this history it seems evident that the disease was neither cancer nor tuberculosis. Lambret considers it inflammatory and of an unknown origin. The time since the operation is not given.

Carcinoma of the Splenic Flexure of the Colon. Madelung¹ has collected reports of 100 cases of carcinoma of the splenic flexure: 3 of the patients were less than twenty years old, while 86 were between forty and eighty years of age. The diagnosis of carcinoma is particularly difficult because the tumor is rarely palpable at an early stage; furthermore, pain is not a prominent symptom, nor is obstruction an early symptom in most cases. Artificial distention of the bowel with air has only occasionally assisted in the establishment of the diagnosis. When a tumor is so high up it is rarely possible to demonstrate blood or mucus in the stools. An exploratory laparotomy is usually necessary to establish the diagnosis.

These records show one encouraging feature, and that is that resection of the affected intestine may bring about a perfect cure even when the disease is fairly well advanced. In this regard the prognosis is more favorable than it is with carcinoma of other portions of the large intestine, and especially of the cecum. From his own experience, as well as from the study of these cases, Madelung strongly recommends that the operation be performed in different sittings. Naturally any swollen lymph glands in the mesocolon should be removed, together with the accompanying membrane. Resection of the intestine was performed in 34 cases; in 20 the patient recovered from the operation; 1 was reported alive and well six weeks later, 1 ten weeks later, 1 after a period of five months, 1 after a period of nine months, and 3 after a period of two years.

Laparotomy for Carcinoma of the Rectum. Kraske² advocates a preliminary laparotomy in cases of rectal carcinoma even though the tumor is to be removed by a sacral operation. Only in this manner is it possible to determine the extent of the tumor, to remove affected lymph glands, and to clean out the posterior portion of the pelvis. In every case the laparotomy should be performed before a perineal or sacral incision is made. This will materially reduce the risk of infection. If it is found that the tumor is too extensive for complete removal an artificial anus should be established. The abdominal incision may be in the median line, or a little to the left, as the operator prefers. In France, Quénu and some others establish a permanent artificial anus, and remove the whole rectum through a perineal incision. Kraske is strongly opposed to this, and saves the sphincter and anal portion of the rectum whenever it is possible to do so. When the case warrants it he follows the recom-

¹ Archiv f. klinische Chirurgie, 1906, vol. lxxxi, pt i, p. 206.

² Ibid., vol. lxxx, p. 634.

mendation of Maunsell, who frees the affected portion of the intestine, invaginates it, and brings it out through the dilated anus. Resection is then performed outside of the body. If the extent of the tumor prevents this invagination, the intestine is ligated above the tumor and divided between the ligatures with a thermocautery. The diseased portion of the intestine is dissected out and the bowel is divided below the tumor. With the removal of the diseased section the abdominal portion of the operation is at an end. The cut ends of the intestine, ligated and wrapped with gauze, are left in the pelvis and the patient is changed from a Trendelenburg position to one upon the right side. A sacral incision is then made and a circular suture is performed.

Kraske has performed this operation upon 10 patients, in all of whom the carcinoma was well advanced; 6 of these recovered; 2 of the deaths he attributes to the length of the operation, and believes that further experience with this technique will considerably reduce this mortality. Not enough time has elapsed to permit the ultimate results of this method of operating to be compared with the results obtained by the sacral method.

THE COMBINED METHOD OF OPERATING UPON CARCINOMA OF THE RECTUM. Rotter's¹ technique is as follows: The pelvis of the patient is elevated. A median abdominal incision, combined if necessary with division of the left rectus just above the pubes gives the best exposure of the pelvis. The intestines are pushed upward and held there with pads, leaving only the sigmoid flexure in the pelvis. When the mesocolon is divided to the outer side, the sigmoid becomes more movable. The peritoneal attachments are then divided on all sides; the vessels in the meson including the superior hemorrhoidal are ligated and divided, and the intestine can then be dissected out with the fingers as far as the levator and without fear of hemorrhage. In the same manner the intestine is freed from the bladder and prostate. When the intestine has been freed posteriorly as well, the cut peritoneal edges are sutured behind it as far as possible. This completes the abdominal portion of the operation, and the abdominal wall is sutured. The patient is placed upon the right side, a parasacral incision is made, and the coccyx is resected. The previously loosened intestine is brought out of the wound, especial care being taken not to rupture the tumor.

If the vitality of the upper portion of the dissected intestine seems doubtful, or if the patient's condition necessitates an early termination of the operation, the intestine is resected and a sacral anus established. This was done in 14 of the 25 cases which form the basis of his paper. In 3 other cases continuity of the bowel was obtained by a circular suture, whereas 8 times some form of invagination was employed. Of these 25 patients 11 died a short time after the operation; in 12 of

¹ Archiv f. klinische Chirurgie, 1906, vol. lxxxi, pt. ii, p. 33.

the other 14 cases an attempt was made to obtain continuity of the bowel. This was successful in 4 cases at the first operation, and in 6 other cases after subsequent operations; 10 patients out of the 25 were therefore discharged with complete continence.

Rotter emphasizes the necessity of great care during the after-treatment. He places his patients upon a water bed, and turns them every hour from one side to the other to avoid bed-sores. He changes the dressing on the third day, thinking thereby to avoid the spread of any infection which may be present.

The causes of death in his operations were as follows: Shock, 2 cases; peritonitis, 3 cases; infection of the wound, 4 cases; ileus, due apparently to gauze packing, 1 case; pneumonia, 1 case.

The method by invagination can easily produce gangrene of the invaginated portion, so that Rotter inclines more and more to a circular suture, covered either primarily or secondarily with a flap of skin.

RESULTS OF OPERATION FOR CARCINOMA OF RECTUM. Du Pan¹ reports the results of radical operation for cancer of the rectum upon 48 patients in Kocher's clinic from 1890 to 1904. He describes in detail the method of Kocher's posterior median incision (removal of the coccyx, resection of the portion of intestine involved, complete suture of the cut intestinal ends). Unfortunately the suture often gives way and the patient is left with a coccygeal anus. To avoid this Kocher has introduced the following technique: After the coccyx has been resected, two fingers of the left hand, in a rubber glove, are inserted into the rectum as a guide to the dissection of the rectum up to the tumor. With the right hand the tumor is then forced downward to invaginate it. This renders prominent the peritoneal reflection, which is then divided on both sides. The tumor can then be invaginated still farther, and the serous suture is inserted anteriorly in the wall of the rectum above and below the tumor. The tumor can then be extirpated with scissors, beginning in the anterior portion of the wall, and an immediate suture of mucous and muscular tissues inserted. Posteriorly the perirectal tissue, including all the enlarged glands, is removed. Kocher never sutures the peritoneum, trusting to a tampon of gauze to protect its cavity.

Du Pan believes that a suture as exact as possible is the better form of treatment, and he supports this view with statistics of a number of different operators. The treatment of the cut ends of the rectum has been the cause of much discussion. The invagination of the upper end into the lower and its fixation above the anus is followed by a lower mortality and a better functional result than is resection and circular suture. The mucous membrane of the lower portion of the rectum as

¹ *Revue de chirurgie*, 1906, vol. xxxiv, pp. 135 et seq.

far as the anus should be excised in order to facilitate prompt union of the invaginated portion. By this method, spoken of as amputation of the rectum, Hochenegg has operated upon 63 patients, with only 1 death from fecal infection. Complete continence was obtained in 21 cases. The mortality among 48 cases operated upon by Kocher since 1890 was 21 per cent.: 4 patients died from peritonitis, 2 from infection, 2 from pulmonary complications, 1 from hemorrhage, and 1 from perforation of the bladder. Of the surviving 38 patients 12 died in less than four years from local recurrence. It is noticeable that the chance of recurrence is greatly diminished if the perirectal tissue for some distance from the tumor is removed. Six other patients died at varying times from metastases. Of the remaining 20 patients 5 died apparently free from recurrence, from other diseases, 2 of them having lived more than seven years. The remaining 15 patients were alive at the time of report, without evidence of recurrence, at periods varying from seven months to eleven and a half years after operation. Only 5 of these patients had passed the four-year limit.

AXIOMS IN TREATMENT OF CARCINOMA OF THE RECTUM. 1. Every suitable case of cancer of the rectum should be subjected to immediate excision or resection by some of the half-dozen well-recognized varieties of the operation.

2. Every other case should be at once treated by colostomy.

3. No physician is justified in using his influence against some form of operative relief, radical or palliative.

These three statements are what Kelsey¹ calls axioms in the treatment of cancer of the rectum. He regards as operable any cancer of the rectum which is movable, which is still confined to the rectum, even if all the coats are involved and there is a slight attachment to the prostate or vagina. Any cancer of the rectum which has involved the surrounding tissues (prostate, bladder, vagina, uterus, or bony points of the pelvis) to an extent which makes a hard, immovable mass on digital examination is inoperable. In one case there exists a cancer of the rectum, in the other a cancer of the pelvis. But not all circumscribed and unattached growths are operable. The age of the patient, his general health, and surroundings have to be considered. It is unpleasant to perform a complete removal of the rectum and find a fortnight later that the patient has a metastatic nodule in his liver. Yet this may happen to the best diagnostician. It is also unpleasant to find ascities, for this too means metastasis.

The risk of the operation in skilled hands is low. Kelsey puts his mortality at about 3 per cent. He prefers the sacral operation for cancers of the middle and upper thirds of the rectum. Control of hemorrhage and speed in operating are essentials for a low death rate.

¹ Medical Record, 1906, vol. lxx, p. 524.

OPERATIONS FOR CARCINOMA OF THE RECTUM. Gant¹ discusses the various operations for radical removal of carcinoma of the rectum, and states the indications for each. Inferior proctectomy is performed only when the growth is situated in the lower three or four inches of the rectum. After the removal of the tumor the upper part of the bowel is freed sufficiently to permit of suture to the lower portion, thus preserving the normal anus and sphincter. If the sphincter is involved, as it may be in low-seated, cylindrical-celled carcinoma, as well as in advanced anal cancer (Fig. 40), a circular incision is made through the skin well away from the tumor, the rectum isolated, the diseased portion amputated, and the upper portion isolated, brought down, and sutured to the skin.



FIG. 40.—Epithelioma involving the anus and rectum. (Gant.)

When the tumor of the rectum is higher up, Gant prefers the sacral operation (vaginal if the tumor is not more than five inches above the female anus), reserving laparoproctectomy for those cases in which the growth cannot well be removed from below. The laparotomy is first performed, and if conditions warrant it a resection and end-to-end anastomosis is performed. Otherwise the operation is completed by one of the methods of attack from below.

The mortality in the hands of the expert surgeon is 7.5 per cent. for inferior proctectomy and 21 per cent. for superior proctectomy. The percentage of cure is given as about 16 per cent.

¹ New York Medical Journal, 1906, vol. lxxxiv, pp. 111 and 319.

POSTOPERATIVE TREATMENT OF CARCINOMA OF RECTUM. Hochenegg¹ believes that the after-treatment following the sacral operation for cancer of the rectum is of far greater importance than it is after most operations. He therefore gives some rules which he has learned by experience:

1. The patient should be kept lying on one or the other side, and never upon the back. The latter position may favor the extension of suppuration into the subcutaneous cellular tissue.

2. The pelvis should not be elevated above the abdominal cavity. Hochenegg mentions the death of a patient through neglect of this rule. On the eighth day after operation there was fever, and the patient assumed a knee-elbow position to facilitate the dressing of the wound. As a result an abscess situated between the intestine and bladder ruptured and so infected the peritoneal cavity that the patient died twenty-six hours thereafter. Another patient was dressed in the knee-elbow position in order to control a venous hemorrhage. During the dressing the patient collapsed, became cyanotic, and died in a quarter of an hour, with the typical symptoms of air embolism.

3. In some cases during convalescence, coughing or straining will cause the intestines to prolapse. They can be replaced more readily if the patient's pelvis is somewhat elevated. This has happened several times in Hochenegg's experience, and no ill result has followed except a sacral hernia.

4. Retention of urine is to be expected. It is common after other operations on the rectum, but is of especial importance after the sacral operation, since the bladder may distend posteriorly into the abnormal sacral space, and thus escape observance until it is so distended that it will not again fully contract. The rule should be to draw the urine by catheter if it is not passed voluntarily in twelve hours.

5. Fluid feces poison the wound, while hard or pasty feces have little injurious action upon it. Hence strong laxatives are to be avoided, and enemas are of service to facilitate an action of the bowels about the sixth day. If one goes to the other extreme, and holds the stool back with opium for a much longer time, the hard column of fecal matter will usually tear open the suture of the bowel. A good plan is to open the wound and irrigate it for a few minutes every time it becomes soiled with feces. If there is any sign of infection this should be done several times a day, and a moist dressing of aluminum acetate kept in the wound.

6. It is of the greatest importance that when the patient is up and about he keep his bowel thoroughly emptied. Otherwise the colitis which has previously existed will not subside. Hochenegg advises his patient to make strong pressure during the act of defecation, so as to accomplish this end.

¹ Deutsche Zeitschrift f. Chirurgie, 1906, vol. lxxxv, p. 508.

Hemorrhoids. Pilcher¹ recommends a method for the treatment of hemorrhoids which is more in accord with modern technique than the clamp and cautery operation. The essential points are as follows: empty-

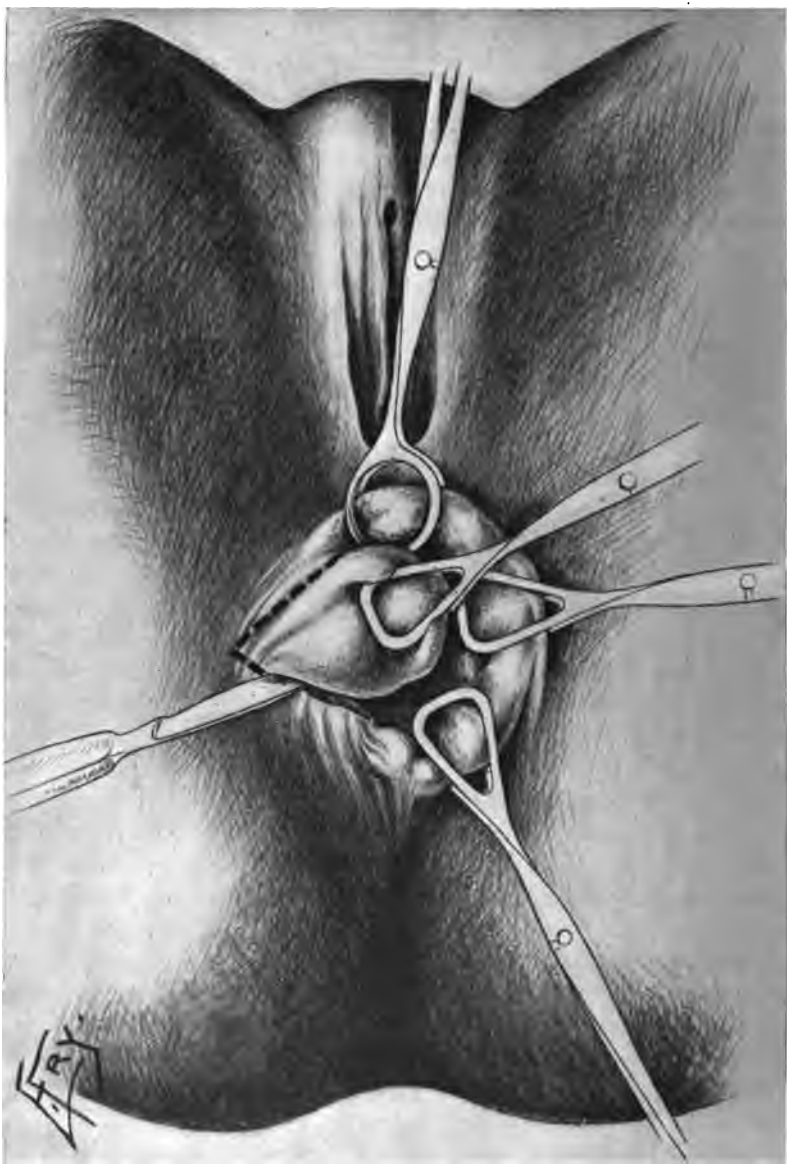


FIG. 41.—The most discrete hemorrhoidal masses seized by ring forceps; one is being loosened from its base externally by the knife. (Pilcher.)

¹ *Annals of Surgery*, 1906, vol. xlv, p. 275.

ing of the bowel thirty-six hours previously, by a cathartic, followed by enemas, the last of which is given at least eight hours previous to operation.

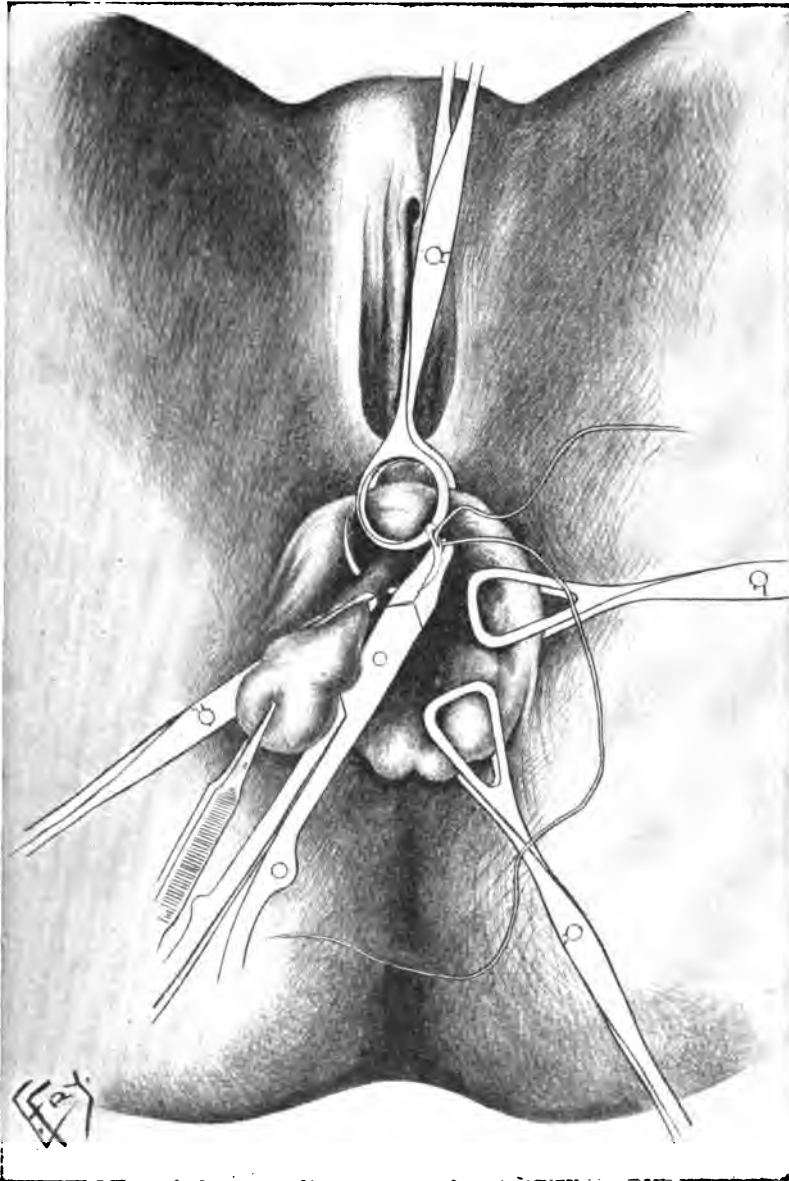


FIG. 42.—The loosened hemorrhoid attached by pedicle of mucosa, which is clamped by hemostatic forceps; a ligature is being passed through the fold of the mucosa above the joint grasped by the clamp. (Pilcher.)

Complete surgical anesthesia, an exaggerated lithotomy position, thorough dilatation of the sphincter, and seizure of the individual piles with ring

forceps are steps common to all methods. Traction is made upon one of the forceps and the skin and mucous membrane are divided along

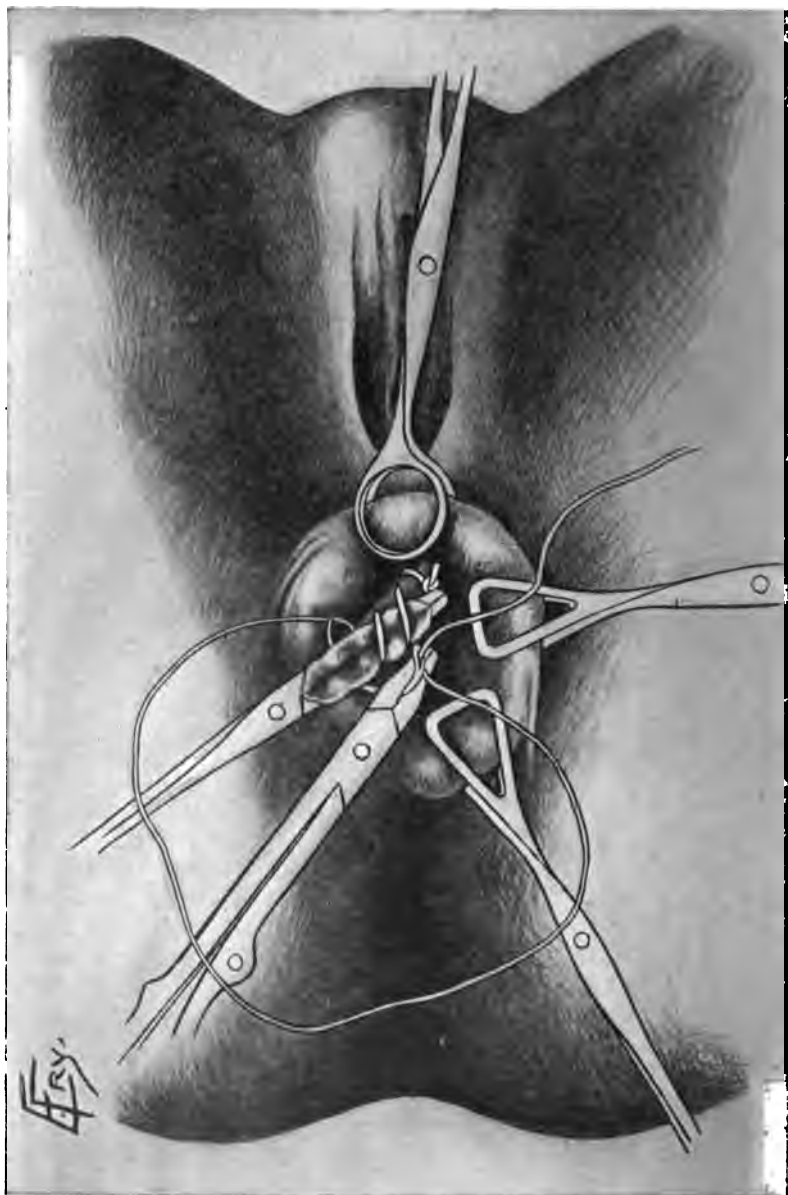


FIG. 43.—The ligature is passed as a running suture over the stump of the pile and beneath the grasping clamp. (Pilcher).

each side of the pile by incisions which make an ellipse (Fig. 41), and when closed by a subsequent suture will form a wound in the long

axis of the bowel (Fig. 44). The divided skin and mucous membrane is pushed back from the pedicle of the pile, a suture is inserted through

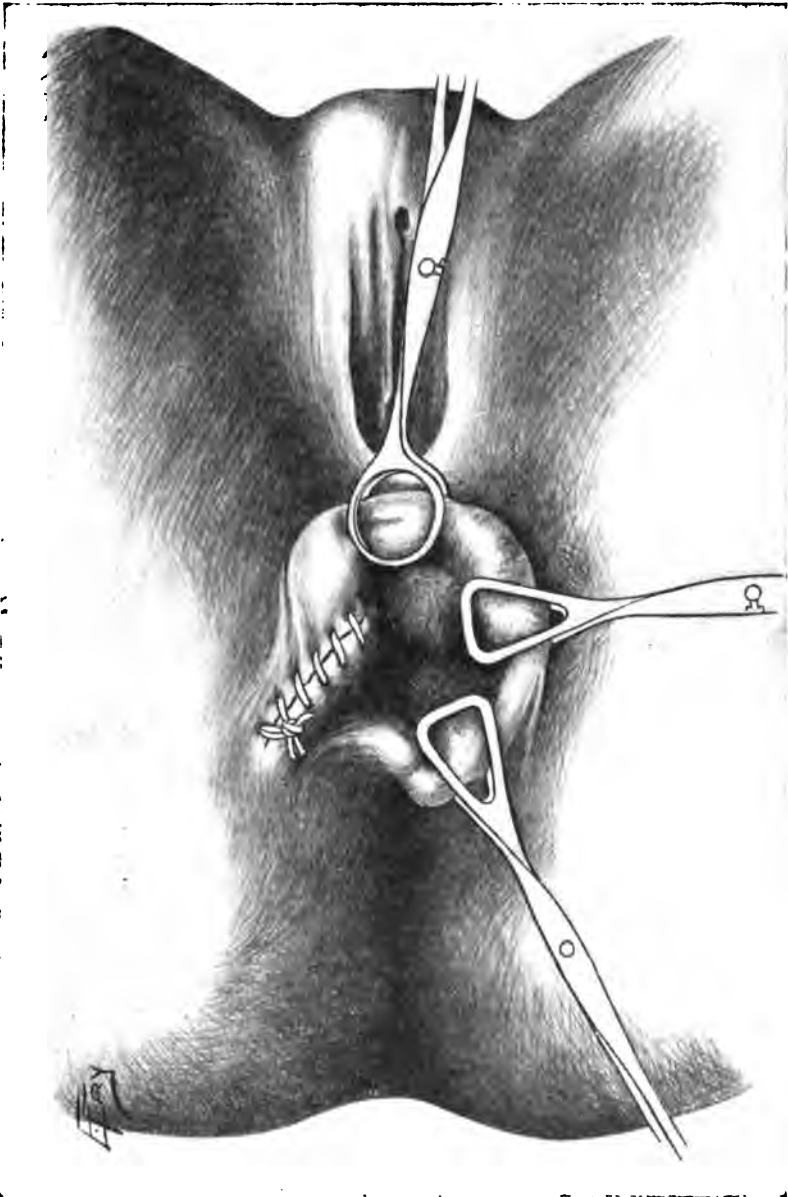


FIG. 44.—The clamp is removed and the suture drawn up and tied. (Pilcher.)

the mucous membrane above the pile (Fig. 42) and tied. This controls a great part of the hemorrhage. A hemostatic clamp is affixed to the

pedicle of the pile, and the portion which projects beyond the clamp is cut off. The suture is then completed as a continuous one (Fig. 43) before the removal of the clamp; after its removal the suture is drawn tight and tied (Fig. 44). If the incision is extensive it is well to insert a few stitches and knot the suture, and insert a second so as not to trust too much to a single thread.

This operation is essentially the same as one recommended by Mitchell some years ago in the *British Medical Journal*. We are indebted to Pilcher for bringing it into prominence with such remarkably clear illustrations. After reading Mitchell's description I tried it in 2 cases, and found each time that it was followed by a great deal of pain. This may have been due to too tight suturing, in order to control hemorrhage, for in 1 case the tissue included in the sutures sloughed. The ultimate results were excellent. I have since varied the operation slightly, by ligating the pedicle exposed in the manner described, and then suturing the cuff of skin and mucous membrane over it. This takes a few minutes longer, but avoids the necessity of using the skin suture to control hemorrhage. In no case in which I have employed this method has there been much pain after operation.

PROLAPSUS ANI AND INTERNAL HEMORRHOIDS. Newman¹ treats cases of internal hemorrhoids and prolapse of the anus by cauterizing the mucous membrane of the rectum in six narrow strips from above downward. Each is four inches long and one-quarter of an inch broad. This is done by means of a six-inch speculum an inch and a quarter in diameter, having six slits or windows.

This is inserted under general anesthesia, the obturator is withdrawn, and a disk inserted to prevent the bowel above speculum from being burned. The mucous membrane which projects through the slit is freely cauterized with a red-hot iron or a Paquelin cautery at a dull heat. Care should be taken not to cauterize the anus.

Imperforate Anus. Forsdike² was called upon to operate in 2 cases. In 1 the rectum was separated from the well-formed anus by a membrane only. On the third day this was incised and then entirely cut away. The recovery was perfect. In the other case operation was also performed on the third day. There was no bulging of the rectum against the anal dimple, and dissection as far up as the sacrum failed to disclose any rectum, but merely a hard cord. An iliac colostomy was therefore established. The child lived eight weeks. A probe passed into the bowel from above would not go farther downward than the left iliac fossa. Forsdike emphasizes the difficulty of operation from below in such cases, because of the lack of space. The tuberosities of the ischia were so near together that the fore-finger was with difficulty introduced between them.

¹ Lancet, 1906, vol. ii, p. 1719.

² Ibid., vol. i, p. 825.

THE LIVER AND BILIARY TRACT.

Subcutaneous Rupture of the Liver. Hubbard,¹ writing upon subcutaneous rupture of the liver, says that the right lobe is injured three times as often as the left. The injury is usually followed by marked shock; later the rigidity and spasm of the abdominal muscles may be extreme. The general abdominal tenderness becomes more and more localized over the liver. The proportion of cases showing jaundice is small, and as this symptom is due to the resorption of bile from the peritoneal cavity it comes too late to be of help in diagnosis. The important conditions from which to differentiate rupture of the liver are contusion of the abdominal wall, fracture of the ribs, and intrathoracic injury.

It is wrong to waste time in the attempt to differentiate rupture of the liver from rupture of some other abdominal organ, since the treatment for all of them is identical. If the rigidity of the abdominal muscles continues after the local application of heat, if there is steadily rising pulse, and localized tenderness and dullness in the flanks which shifts with change in position, there is intra-abdominal injury. If the tenderness and muscular spasm lie over the liver, the probability is that the lesion will be found in that organ. Hubbard recommends an incision above the umbilicus, enlarged, if necessary, by one running along the edge of the ribs. If the rupture of the liver is so far back on the convex surface that it cannot be reached readily through the abdomen, a second incision should be made through the thorax, a portion of rib excised, the pleural cavity closed by suture, and incision made through the diaphragm. In this way hemorrhage can be controlled by suture or gauze packing.

TREATMENT OF RUPTURE OF THE LIVER. Von Hippel² expresses a preference for suture in the control of hemorrhage of the liver, and says that in this respect he is in accord with Schlatter, Terrier and Auvray, Fränkel, Lejars, Thole, Kehr, Vanverts, and Sato. Tamponade should only be employed when suture is not practicable, as, for instance, when the edges of the wound are much crushed and torn, or some of the larger vessels are ruptured and cannot be reached by suture; or, if it is necessary to bring the operation to a speedy close, on account of the condition of the patient. It is only fair to state that other surgeons, notably Lexer, Wilms, and Finkelstein prefer tamponade, not only because it is quicker and can be carried out through a smaller wound in the abdominal wall, but they believe that it lessens the risk of infection by affording excellent drainage. Fränkel and Kehr guard against the

¹ Boston Medical and Surgical Journal, 1906, vol. clv, p. 671.

² Archiv f. klinische Chirurgie, 1906, vol. lxxxi, pt. ii, p. 184.

risk of peritoneal infection after suture by using gauze as a protection to the line of suture.

When a tampon is used it should be left in place undisturbed for a week, and then should be gently pulled upon each day, so that it will be removed in ten or twelve days. If it is pulled out in two to four days, as has sometimes been recommended, von Hippel says the patient is exposed to the risk of hemorrhage.

Lund and Howe¹ report 2 cases of rupture of the liver and discuss the best methods of controlling hemorrhage. There is no special blood-vessel which one can tie to check a hemorrhage in any portion of the liver. Formerly gauze packing and the actual cautery were the methods employed. More recently it has been shown that sutures are preferable, as they control the hemorrhage better and favor repair. The sutures must be large and should be applied in the form of loops to avoid cutting through the tissue. The advantage of blunt needles has for some time been recognized, for they are less likely to puncture the veins. In one of the cases reported the injury was so extensive that it could not be entirely sutured, and some gauze packing was necessary. This controlled the hemorrhage, and the removal of the gauze on the fifth day was followed by no fresh hemorrhage. The patient died, however, on the following day. Besides the multiple ruptures of the liver there were fractures of three ribs and pulmonary edema and congestion.

Cannaday² reports 6 cases of injury of the liver in which he was able to control hemorrhage either by gauze packing or by suture. Most of these patients were the subjects of pistol-shot or gunshot wounds. The injuries to the liver were, in nearly every case, accompanied by perforations of stomach or intestine, 1 patient having no less than thirty-eight of these; 3 patients recovered and 3 died of sepsis. While it is impossible to draw definite conclusions concerning the treatment of the wounds in the liver under such complicated circumstances, a careful perusal of these reports inclines one to agree with Cannaday when he says that hemorrhage from the liver should be controlled by suture, and that gauze packing and drainage should be avoided.

RUPTURE OF THE HEPATIC DUCT. Very few cases of rupture of the hepatic duct have been reported, and according to Hildebrandt³ there is no record of a successful repair of this injury by operation. In the case reported a slender, five-year-old girl was run over by a two-wheeled cart. She vomited and the abdomen swelled, but there was a normal movement of the bowels. There were abrasions on the head and left leg and an extensive ecchymosis about the umbilicus. The pulse was rapid; there was a very slight fever. The child remained in about this condition for three weeks, at which time bile was detected in the urine.

¹ Boston Medical and Surgical Journal, vol. clv, p. 669.

² Lancet-Clinic, 1906, vol. lvii, p. 449.

³ Archiv f. klinische Chirurgie, 1906, vol. lxxxi, pt. i, p. 647.

A short incision made in the median line proved the distention of the abdomen to be due to free bile, and yet the presence of coloring matter in the feces showed that there could not be a complete rupture of either the hepatic or common duct. The region of the liver was explored through the incision recommended by Courvoisier. The colon was attached to the liver by light adhesions, which were easily separated, and after some search a tear was found in the hepatic duct about 1 cm. in length. The liver itself was uninjured. As sutures inserted in the duct would not hold, a rubber drainage tube was inserted and brought out of the wound. The child completely recovered within a month.

The diagnosis in such a case is apt to be very obscure. After the first shock there is gradual swelling of the abdomen due to the escape of bile into the peritoneal cavity. If the duct is completely ruptured the stools will, of course, be clay-colored. In most of the cases cutaneous icterus was noted. The patient rapidly loses flesh. This is partly due to the escape of bile into the peritoneal cavity and partly due to the poisoning produced by the resorption of acid bile salts. Indeed this may produce death in a comparatively short time. There is usually some fibrinous peritonitis which may be bacterial if the common duct is torn off close to the duodenum. With an incomplete rupture the stream of bile constantly flowing into the duodenum makes the exit of bacteria from the intestine less likely. Judging from the reported cases the prognosis is very bad, but this is probably merely because proper treatment was so long delayed. Stierlin mentions 11 cases of rupture of the common duct with 3 recoveries.

Abscess of Liver. Gabbi¹ discusses the diagnosis of abscess of the liver as it appeared in 6 patients under his observation. In 1 the pain was paroxysmal and the liver was movable. The abscess was a small and very deep one, so that the pain was probably due to rapid stretching of the capsule. In another case the pain was very intense, but the abscess when exposed was a very small one. It was, however, near the capsule, to which fact he attributed the severity of the pain. Abscess in or near the convexity of the liver seems to give pain in the scapular region. If the abscess was in the lower half or in the outer part of the right lobe, the pain was in the lumbar or ileocostal region. In 1 case the lower portion of the liver was adherent to the posterior abdominal wall. This gave rise to lumbar pain. In such a case true descent of the liver on inspiration is impossible, yet the anterior edge of the liver bends downward during inspiration. The difference between this and a normal descent can be noted if one watches the lower edge closely. The diagnosis of abscess should not be abandoned because the liver feels uniformly hard. This may be due to a preëxisting cirrhosis, as was the case in 2 of his alcoholic patients.

¹ *Riforma medica*, 1906, vol. xxii, No. 17.

SOLITARY ABSCESS OF THE LIVER. Elsberg¹ divides solitary abscesses of the liver into four classes: tropical, traumatic, pyemic, and those secondary to some abdominal affection. During the past five years 18 patients with solitary liver abscess have been operated upon by Elsberg and his associates in his hospital service. In 16 cases the abscess was situated in the right lobe, and with one exception in the upper part of the right lobe. The largest quantity of pus occurs in those cases in which the abscess has secondarily invaded the subphrenic space. The pus was yellow, brownish, reddish, or greenish. Bacteriological examination was made in 10 cases. In 6 the pus was sterile; the *Staphylococcus citreus*, *streptococcus*, *Bacillus coli*, and anaërobes were each present in 1 case. In 6 of the 18 patients the pus had burst into the subphrenic region, but in no case had the diaphragm perforated. Fever was present in every case, and loss of flesh was marked. Some patients lost from ten to twenty pounds in one or two weeks. The liver was enlarged in all but 1 of the cases. Operation is recommended as soon as the pus has been demonstrated by the aspirating needle.

In the large majority of cases the abscess is located in the upper part of the liver and had best be approached through the wall of the chest (transpleural thoracotomy). When the diaphragm has been incised, if there are no adhesions between it and the liver, the peritoneal cavity should be carefully walled off on all sides by gauze. This should remain undisturbed for six or ten days; the liver is then aspirated, and if pus is found a grooved director is pushed into the abscess alongside of needle, and the opening dilated with dressing forceps. If the abscess is very deep it may be advisable to open it with a cautery to avoid hemorrhage. If the abscess has burst into the subphrenic space, it is necessary to drain this space and also the abscess cavity in the liver. Exploration with the finger will show whether this can best be accomplished with a single tube or with separate tubes.

Loison² reviews 44 cases of abscess of the liver in which he was called upon to operate. He finds the early diagnosis difficult. The general symptoms, developing usually in a patient who has diarrhea or dysentery, are: pain in the right hypochondrium, acute or chronic infection, slight or marked enlargement of the liver, tenderness on pressure in the intercostal spaces or in the epigastrium, and shallow respiration. Exploratory puncture alone will give a positive diagnosis.

If the puncture is negative no harm is done the patient, according to Loison's experience. He does not agree with those who say that an exploratory laparotomy is no more dangerous than puncture. Loison follows the successful puncture by an incision. If this is transpleural he resects the rib above or below the needle, according to the location of the greatest swelling.

¹ *Annals of Surgery*, 1906, vol. xlv, p. 217.

² *Revue de chirurgie*, 1906, vol. xxxiii, pp. 228 et seq.

The pleural cavity is opened, if necessary then the diaphragm is divided, and then the liver is incised and drained.

Loison does not fear opening the pleural cavity. Before he does so he places the patient on his back while an assistant presses the lower part of the thoracic wall down and the liver up. Second, the liver is never allowed to escape from the wound. The trocar remains in place until a dilator is introduced. This is followed by the finger and that by the drains.

He has never had infection of the pleural or peritoneal cavity following thoracic operation for abscess of the liver. When an assistant has not been available he has sometimes walled off these cavities during the operation with gauze. Irrigation of the abscess cavity has been abandoned. Drainage of an abscess of the liver through the abdominal wall should be avoided in most cases, since it is not direct, and sometimes has to be supplemented by thoracic drainage. Loison completes the abdominal operation at once without suturing the edges of the hepatic wound to the parietal wound for protection of the peritoneal cavity. He depends upon approximation of the liver to the parietal peritoneum to prevent infection of the peritoneal cavity.

Taylor,¹ of South Wales, has twice successfully drained an hepatic abscess, using the transpleural operation, with resection of two and one-half inches of the ninth rib in each case. The second patient had previously been operated upon by aspiration, with only temporary relief—the drainage having proved insufficient. Both patients made a satisfactory recovery, though in the first case a second abscess, just below the costal margin, required opening during convalescence.

In both cases the diagnosis of abscess was made by puncture and the needle was left in place until the incision was made.

CURE BY INJECTION OF QUININE. Rogers and Wilson,² report 2 cases of hepatic abscess which they were able to cure by aspiration and injections of a solution of bihydrochlorate of quinine, 30 grains to 4 ounces of water. In the first case 10 ounces of pus were aspirated through the eighth intercostal space fifteen days after the onset of fever. No amebas were found in the pus. Three ounces of the sterilized quinine solution were at once injected through the cannula. Three days later the patient was able to sit up, the temperature being normal. In less than three weeks he was completely well.

The other patient had three attacks of hepatitis in nine months, and an abscess was located during the third attack. Through the ninth intercostal space 10 or 12 ounces of pus were aspirated and 50 grains of bihydrochlorate of quinine in 5 ounces of sterile water were injected. The fever subsided and the patient sat up on the third day. The pus

¹ New York Medical Journal, 1906, vol. lxxxiv, p. 1263.

² British Medical Journal, 1906, vol. i, p. 1397.

in this case contained numerous inactive amebas. The liver was still large one month later and a second puncture was made, but no fluid was obtained, and the patient made an uninterrupted recovery, though less rapid than in the other acuter case.

DRAINS IN ABSCESS OF THE LIVER. Valence¹ says that the drains used for abscess of the liver should at first be as large as possible, and long enough to reach the opposite wall of the abscess. They should be reduced both in size and length as soon as lessening secretions makes such alterations safe. Furthermore, the drains should be flexible so that they may not cause ulceration in the wall of the abscess. One must remember that the liver is constantly in motion.

Surgical Significance of Jaundice. Lloyd² says that in operating upon jaundiced patients two conditions must be carefully considered, namely, changes in the blood and the functional activity of the kidneys. Changes in the blood are not well understood. The most evident change is a delay in coagulation. According to Osler the time required for the coagulation of normal blood is three or four minutes, but in a jaundiced patient as much as thirteen and one-half minutes may be required. As a result there may be hemorrhages from the mouth, nose, bronchi, kidneys, stomach, intestines, or the hemorrhage may be subcutaneous. Calcium chloride, gelatin, adrenalin, and other drugs have been given to increase the coagulability, but Lloyd has never seen much benefit from their use. The hemorrhage does not usually occur at the operations, but rather one to three days later. He has had this experience several times. For example, one patient, a man aged forty, from whose common duct Lloyd had removed a stone, was doing perfectly well until the fourth day. He then made a sudden movement, on account of pain due to gas in the intestine, and blood began to ooze into the dressings. The dressings were changed, but in an hour were again saturated. The skin wound was intact, but it was pulled apart and the hemorrhage was seen to come from innumerable capillaries in the deeper portion of the wound, which had been torn open by the sudden movement of the patient. In spite of mattress sutures, clamps, adrenalin, and other measures, the hemorrhage continued and caused the death of the patient twelve hours later.

Changes in the kidneys are also important. If to the toxemia of the jaundice there is added the toxemia of nephritis, the patient is in a bad condition to withstand any operation. As the nephritis in most of these cases is secondary to the jaundice, these patients should, if possible, be brought to the surgeon before these secondary changes have taken place. Patients with jaundice that are operated upon early, before they are suffering from general toxemia, usually recover promptly.

¹ *Revue de chirurgie*, 1906, vol. xxxiii, p. 101.

² *New York Medical Journal*, 1906, vol. lxxxiv, p. 222.

Etiology of Gallstones. Funke¹ reviews the work which has been done recently in order to explain the occurrence of gallstones. Perhaps the first thing that experimenters noticed was the favoring influence exerted by stagnation of the biliary flow. This is usually followed by infection. Calculi have been experimentally produced in animals, but only when there is occlusion of the common duct, or an impediment to the outflow of bile from the gall-bladder. A foreign body in the gall-bladder may be sufficient to obstruct the outflow. It has been noted that attenuated cultures of bacteria must be employed to produce the infection, and in man it has been observed that suppurative cholecystitis is not usually associated with gallstones. In catarrhal cystitis there are plenty of mucins and pseudo-mucins to agglutinate the bile salts, and the epithelial cells undergo degenerations calculated to form cholesterin. If the infection is severe the cells undergo necrosis. Although it seems established that infection and impediment to the outflow of bile are necessary factors in the causation of gallstones, there must be some other factor, since there may be occlusion of the cystic and common duct, and infection of bile in the gall-bladder without the formation of stones.

Bishop² suggests that for practical purposes cases of gallstones be divided into those which are associated with inflammation and those which are not. He thinks that a further division of the cases with inflammation into those in which the inflammation is superacute (phlegmonous cholecystitis), acute, and subacute will serve a clinical purpose, by directing attention to the important part played by the inflammation of the tissues.

CHRONIC APPENDICITIS THE CAUSE OF GALLSTONES. Sheldon³ says the frequency of the coexistence of chronic appendicitis and gallstones in itself suggests the possibility of a relationship between them. But if chronic appendicitis can cause gallstones, why do some patients who have chronic appendicitis have no gallstones? The power of the liver to destroy bacteria (Welch) would seem to offer the explanation. If the bacteria from an appendicitis brought to the liver by the portal blood were destroyed by the liver, no bile-passage infection would occur from this source; but if the liver, owing to its inefficiency, or on account of the number and virulence of the bacteria brought to it, could not destroy them, but turned them into the bile stream, perhaps with their degree of virulence diminished, bile-passage inflammation might occur.

Diseases of the Biliary Tract. Deaver⁴ says that he is now convinced that the origin of all diseases of the biliary tract is in some form of bacterial infection. The calculi are merely an incident in the disease

¹ New York Medical Journal, 1906, vol. lxxxiv, p. 1077.

² Lancet, 1906, vol. i, p. 817.

³ Journal of the American Medical Association, 1906, vol. xlvii, p. 1460.

⁴ Ibid., p. 402.

and are not always present. Furthermore, many attacks of biliary colic are not due to the actual passage of gallstones, but rather to a spasm of the gall-bladder, caused by *acute cholecystitis* in the presence of ducts constricted by inflammatory swelling. In support of this statement Deaver quotes Kehr's experience as well as the fact that 16 per cent. of his own 206 patients had no calculi, although they all had either colicky or other pain. It is, of course well known that many patients have gallstones which produce no symptoms.

Deaver advocates the removal of gallstones in every case in which they are known to be present, provided there are no contra-complications which would render any operation injudicious. A second indication for operation is an attack of acute cholecystitis which does not subside under medical treatment in thirty-six to forty-eight hours. This is especially true if the attack is not the first one, or if from the history it seems probable that gallstones are present.

When the attacks of cholecystitis are repeated, and especially when discomfort persists in the intervals, operation is demanded to obtain a cure. Many a patient who has suffered once or twice from mild attacks of catarrhal jaundice, so called, without evident implications of the gall-bladder, will be persistently troubled by periods of anorexia, of flatulence, or of actual nausea; and in time gastric or duodenal ulcer will appear, often enough, no doubt, engrafted on the stomach, whose motility has been seriously hampered by adhesions originating in diseases of the bile passages.

In the later stages of disease of the gall-bladder, operation is almost invariably demanded; but so long as the serious lesions are confined to the gall-bladder the mortality due to the operation is small. In hydrops of the gall-bladder cholecystectomy is required, since obliteration of the cystic duct renders the gall-bladder not only useless, but a continued menace from the liability of reinfection, or even rupture. Empyema requires cholecystectomy only when of long standing, with the result that the cystic walls are irreparably diseased. If the empyema is acute, drainage of the gall-bladder is sufficient, and in cases of doubt is to be preferred to the more serious operation. Gangrene of the gall-bladder and perforation in most cases demand cholecystectomy.

Operation when calculi exist in the gall-bladder only is no more serious than operation for non-calculus cholecystitis. If at the time of operation a stone has descended into the cystic duct, or into the common duct, or if there is one in the hepatic duct, the mortality of the operation is materially increased; yet no conscientious surgeon can hesitate to recommend operation, since the disease under these circumstances is much more fatal than is the operation itself. The underlying condition in all cases of cholelithiasis is the infection, and until physicians can combat this as successfully as surgeons, the less they have to do with acute complications of gallstone disease the better.

Deaver protests against the indiscriminate resort to cholecystectomy in cases in which the gall-bladder is not irretrievably diseased.

When the calculus is removed from the common duct, retention and drainage of the gall-bladder is a valuable adjunct to the after-treatment. When the gall-bladder is removed, apart from the increased immediate danger of infection and hemorrhage, drainage of the liver cannot be so thorough as it is when the gall-bladder is attached to the abdominal wall, and serves as a drainage tract in addition to that provided by a tube in the common duct at the site of the choledochotomy.

The surgeon is occasionally forced to operate on patients with acute infection of a stone in the common duct. If there are in addition evidences of progressing infection, such as persistent jaundice, intermittent fever, and sweats, the only chance of salvation lies in immediate operation, and yet the mortality of such operations is appallingly high. The acute hepatic infection evidenced by enlarged tender liver, by the jaundice and the fever is a serious condition in itself, while the danger of hemorrhage in these patients is great.

There is good reason to believe that acute pancreatitis is often caused by impaction of the calculus in the diverticulum of Vater, by which means the infected bile is dammed back into the pancreatic ducts. Or the calculus may be impacted a little higher, so as to occlude the duct of Wirsung by pressure only. This interference with the escape of the pancreatic fluid may give rise to chronic pancreatitis. That such is not oftener the case is due to the presence of a second pancreatic duct in about two-thirds of the bodies examined; and also to the fact that in about 10 per cent. of all cases the common duct and the pancreatic duct enter the duodenum separately. Operation may be demanded not alone by the cholangitis, but by pancreatitis as well.

Typhoid cholecystitis may be an indication for operation. Among Deaver's 216 patients there were 7 from whose gall-bladder the typhoid bacillus was isolated. When the symptoms of acute cholecystitis occur during typhoid fever, Deaver defers operation unless there is positive evidence that the disease has gone on to suppuration, or to some more serious complication.

EARLY DIAGNOSIS OF GALLSTONE DISEASE. Richardson¹ read a paper upon diseases of the bile passages at the annual meeting of the Massachusetts Medical Society, June 13, 1906. He devoted himself especially to the question of early diagnosis, since the desirability of the removal of gallstones before complications have arisen is universally recognized. He does not, at present, advocate operation for gallstones as soon as their presence is suspected. The chief objection to such a procedure is the difficulty in telling with reasonable certainty when there is some surgical lesion present. Moreover, when explorations of the right

¹ Boston Medical and Surgical Journal, 1906, vol. clv, p. 329.

upper quadrant are freely advised for perhaps trivial symptoms and for symptoms which are not characteristic of any special disease, the door is opened wide for those indiscriminate, ill-considered, and unjustifiable surgical procedures, especially dangerous in the hands of the inexperienced, the amateur, the dilettante operator. Even when the diagnosis is plain, no one has a right to operate on the biliary tract unless he has a large experience in general operating.

Jaundice as a symptom demands special mention. Its weight when present is great, but too much importance must not be given to its absence, for gallstones, sometimes in large numbers, may be situated in the hepatic and common duct directly in the biliary stream, without causing jaundice.

Pain is such an invariable and positive symptom of cholelithiasis that its absence, when all other symptoms point to gallstones, makes the diagnosis of gallstones improbable, and favors the diagnosis of malignant disease. It should be remembered, however, that patients may describe pain under a variety of terms, such as "biliousness," "dyspepsia," "deep soreness," "discomfort," "gastric distress," or "neuralgia."

Another most significant symptom is the irregular recurrence of the pain in a similar or gradually changing form. Thus one attack of "discomfort" in the right hypochondrium may suggest gallstones; a second similar attack suggests them more strongly; a third makes the diagnosis probable; transitory tenderness in the gall-bladder makes it almost certain, while transitory jaundice, though seldom present, establishes the diagnosis. Patients often refer these attacks of pain to errors of diet, and yet the recurrence of symptoms which cannot be reasonably so explained favors a diagnosis of gallstones rather than gastric disturbance.

Richardson has found a single stone suspended in the fluid in an undistended gall-bladder, and yet this patient had had previous attacks of pain. They may have been due to a temporary engagement of the stone in the cystic duct by contraction of the lower part of the gall-bladder upon it. In other cases the gall-bladder has been found full of stones, although no history of pain could be obtained.

The more violent the pain the greater the probability of gallstones.

While the mere presence of gallstones in the gall-bladder is not sufficient cause for operation, a single recurrence of symptoms of impaction is enough to justify operation.

The distinction between gallstones and gastric diseases is chiefly important because under a wrong diagnosis of organic disease we may operate uselessly, as in simple dyspepsia, gastralgia, atony, gastritis, gastroduodenal catarrh, and the like. On the other hand, we may, under a wrong diagnosis of functional disturbance, withhold an imperative operation for gastric cancer, ulcer, strictured pylorus, or gallstones.

The distinction between gallstones and functional symptoms of the stomach lies in the patient's description of the pain; in its irregularity of recurrence; in the means required for its control; in the possibility by any method of prophylaxis of preventing its return; in the absence of constitutional effects; in the maintenance of nutrition, and in the similarity of succeeding attacks, with perhaps a gradually progressive change in them as the pathological conditions causing the symptoms themselves change.

The distinction between ulcer and cancer of the stomach in those cases in which there is only pain, and gallstones in which there is only pain, must be based upon the character of the pain itself; its situation and extent; its time of occurrence; its direction, continuity, persistence, recurrence; its sharpness, dulness, and like characteristics; its exciting causes and its controlling treatment; its constitutional effects, its periodicity, and, now and then, under careful and persistent observation, some objective symptom so trivial and doubtful perhaps as to be almost classed as subjective. All these things will tend to prove the existence either of a biliary or a gastric cause which demands surgical exploration. In many cases this evidence will point so conclusively toward the biliary tract as to exclude the gastric. Indeed, organic gastric diseases are best diagnosticated by the exclusion first of biliary disease.

Chronic pancreatitis may be expected in a certain proportion of cases, especially when there is jaundice. The diagnosis of a gallstone cause for jaundice does not exclude this condition, for it accompanies or follows gallstones, whether in the gall-bladder or in the cystic, hepatic, or common duct. Richardson found enlargement of the head of the pancreas, without gallstones, in the comparatively young, and the disease has been permanently cured, apparently, by cholecystostomy. In suspected acute lesions of the pancreas a history of gallstones adds to the strength of the diagnosis. In all pancreatic lesions, except cancer, the exploration which establishes the diagnosis may be followed by curative operation, especially cholecystostomy for chronic pancreatitis.

Perhaps the most important disease of the liver to eliminate is cirrhosis with jaundice. This condition, however, is extremely unusual in a form which even remotely suggests gallstones; an hypertrophic cirrhosis might; no cirrhosis with ascites would, for the presence of ascites would immediately rule out a gallstone origin.

Many errors in diagnosis in diseases of the right upper quadrant come from inadequate study. Except in the plainest cases the patient in whom gallstones are strongly suspected should be examined several times if the symptoms are not urgent. If the case is obscure, much time should be spent upon it, and the prognosis should be guarded. Cases of obscure origin, however, in which the symptoms are severe, must be explored at the earliest possible moment, even under the possibilities of an unnecessary operation.

Lloyd¹ suggests the following maneuvers for treating gallstones: After outlining the free border of the liver and locating the notch, he places the palm of the hand on the abdominal wall, with the tips of the fingers pointing toward the patient's head. By gentle pressure he pushes the tips of the fingers below the border of the liver and then gets the patient to laugh. The rapid action of the diaphragm in laughing is much better than a single cough. If the gall-bladder is not contracted it will strike against the tips of the fingers, and if there are many gallstones present they may be felt to click together.

RELATION OF GALLSTONES AND SURGERY. Wilcox² in an article on the treatment of biliary calculus says: "The conclusion which we should reach is that gallstone disease is not purely a disease due to a foreign body, but is primarily a hepatic disorder. The removal of these stones has but little to do with the cure of the patient, for when the end result—the removal of the gallstones—has been accomplished by surgery the patient is but at the commencement of his treatment to remove the cause of the disease, which is entirely within the province of the physician. The congestions and inflammations in the domain of the portal system are the conditions that require treatment, and the infectious catarrh of the bile ducts and gall-bladder and faulty bile formation in the liver are those that need correction, and these are purely medical problems."

HEMORRHAGE WITH GALLSTONES. Pereira and Harris³ mention the occurrence of hemorrhage in a gall-bladder already containing some 200 or more gallstones. There was collapse, followed by great pain as the gall-bladder distended. It formed a marked tumor. The diagnosis was cleared when this tumor was cut down upon.

Four ounces of blood were aspirated, the gall-bladder stitched in the wound and opened three days later. The patient recovered.

GALLSTONES PASSED BY RECTUM. Dickson⁴ describes the passage by rectum of three gallstones weighing when dry seventeen ounces and each having a transverse diameter of about 1.5 inches. When fitted together they made almost a perfect cast of the gall-bladder (Fig. 45).

As there never had been any jaundice it seems certain that these stones ulcerated into the intestines direct from the gall-bladder.

Bell⁵ removed from the gall-bladder a stone which quite distended its lumen, weighing 106 grams (3.5 ounces) and measuring 7.5 cm. (3 inches) in length (Fig. 46).

The Mortality of Operations upon the Gall-bladder. The Mayos⁶ report 1500 operations upon the gall-bladder and bile passages, with a mortality

¹ New York Medical Journal, 1906, vol. lxxxiv, p. 222.

² Journal of the American Medical Association, 1906, vol. xlvii, p. 347.

³ Lancet, 1906, vol. i, p. 513.

⁴ Ibid., vol. ii, p. 221.

⁵ Surgery, Gynecology, and Obstetrics, 1906, vol. ii, p. 482.

⁶ Annals of Surgery, 1906, vol. xlv, p. 209.

of 4.43 per cent. These statistics include every death occurring in the hospital following such an operation, no matter from what cause. There were 845 *cholecystostomies* with a mortality of 2.13 per cent. and 319 *cholecystectomies* with a mortality of 3.13 per cent.

Cholecystostomy is the safer operation, and must be looked upon as the normal procedure in the average case. The possibility of reformation of gallstones in the gall-bladder is too remote to be considered; it happened only once in their 1500 cases.

If the cystic duct is obstructed by a stone and the gall-bladder contains no bile, it had better be removed to avoid a secondary operation for



FIG. 45.—Gallstones passed per rectum. (Dickson.)



FIG. 46.—Calculus removed from the gall-bladder of a woman aged fifty-seven. (Bell.)

the relief of mucous fistula or colic due to obstruction. A thick-walled gall-bladder, which has become functionless, should always be removed and examined microscopically; it will often be found carcinomatous. If cholangitis exists the gall-bladder should be retained, not merely because it affords easy drainage, but because it can be anastomosed with the intestine if obstruction of the common duct should arise. In case of secondary operation, it affords a safe guide to the duct.

The operative disability after cholecystostomy was brief. A short incision with separation of the fibers of the rectus muscle rendered early union without hernia almost a certainty. By turning in the cut margins of the gall-bladder about the tube (Summers) in a manner similar to the Stamm-Kader gastrostomy, the bile discharge stopped promptly as, on removal of the tube at the end of the week, the peritoneal surfaces agglutinated. The average patient was up in twelve days and left the hospital within two weeks.

There were 207 operations upon the *common duct*, with a mortality of 13 per cent. This mortality varies greatly according to the type of case; thus the mortality was 2.9 per cent. in those patients in whom gallstones were present in the common duct, but without immediately active symptoms. It was 16 per cent. in those patients in whom there was active infection not only in the common duct, but also in the ducts of the liver. Stones were usually present. These patients had jaundice and fever of a malarial type. Furthermore a patient with these symptoms may have stones in the hepatic duct, a possible source of future trouble. The mortality was 34 per cent. in patients with complete obstruction of the common duct, especially when the obstruction was acute, and accompanied by evidences of infection. It is often wise to wait, under these circumstances, for a period of remission, as acute obstruction from stone is seldom permanent. Finally there were 12 patients with malignant disease of the common duct, either primary or secondary to carcinoma of the gall-bladder, cystic duct, or pancreas. The operation in these cases was usually only exploratory, but, even so, the mortality was 33.3 per cent.

In a total of 86 out of the 1500 patients the *pancreas* was noticeably involved. Four times the involvement was acute; 2 patients recovered and 2 died. There were 6 cases of subacute involvement, 2 of them being *hemorrhagic cysts*; 5 patients recovered and 1 died. There were 9 cases of *cancer of the pancreas*, with 5 deaths. The remaining 67 patients had *chronic pancreatitis*. There were usually hard nodules, most marked in the head of the pancreas, and near to the common duct.

In 4 cases in which the obstruction of the common duct was supposed to be due to the chronic pancreatitis alone, operation revealed a stone in the ampulla.

In summing up the causes of the 66 deaths 10, or 15 per cent., were accidental and could be eliminated. The largest number were due to cessation of the liver function, usually the result of infections, microscopic examinations showing destruction of the epithelial elements of the liver and often fatty degeneration. Next came exhaustion from blood changes due to chronic cholemia.

It was the mortality and complications of delay that placed the early operation for appendicitis on a sound surgical footing. To remove the

disease while still in the appendix and before its rupture involved the abdominal cavity was the logical conclusion.

The same reasons apply and with equal force to the early operation for gallstone disease. Remove the disease while still in the gall-bladder, when the mortality is only from 1.47 per cent. (cholecystostomy) to 1.62 per cent. (cholecystectomy). These are the figures in the last 500 operations of this series.

Kocher¹ reports upon 100 operations upon the biliary tract. The operative mortality was 2 per cent., both deaths occurring after *cystectomy*. He was able to trace the after-history of 82 patients: 1 had died of acute peritonitis, cause unknown; 1 of carcinoma of the uterus; 2 of carcinoma of the gall-bladder; 1 of carcinoma of the pancreas; while the sixth patient died of infection due to the impaction of a gallstone in the duodenal papilla. This was the only recurrence after 30 cystectomies. There was also 1 recurrence after 19 cystostomies, and 3 recurrences after 31 cystotomies with immediate suture; 2 patients suffered from postoperative hernia. This was favored in 1 case by a stitch abscess, and the other by the fact that the operation was carried out through a large median incision made to permit the removal of an ovarian cyst. The general postoperative condition of the other patients was most satisfactory. It was particularly noticeable that the nutrition of the patients whose gall-bladder was removed was not adversely affected thereby.

GALLSTONES: THE CHOICE OF OPERATION. In recent years several surgeons have recommended the removal of the gall-bladder as the normal procedure in cholelithiasis. Beck² does not see the reason for such radical measures in the majority of operative cases. An inflammatory process of the mucous membrane of the gall-bladder quickly heals while drainage is carried on. Stones which pass from the hepatic duct can still be extracted. Cholecystectomy is the more dangerous operation, and while it acts beneficially in selected cases it ought not to be classed as the normal procedure.

Pond³ prefers a two-inch vertical incision for exploration and treatment of the gall-bladder. This is made along the outer border of the rectus muscle (Fig. 47). If additional room is needed this can be gained by extending the incision obliquely from the upper or the lower end, the so-called wave incision. He also emphasizes the importance of a large sand-bag placed beneath the lumbar region in operating in the dorsal position.

Crouse⁴ suggests a new technique for the drainage of an adherent or retracted gall-bladder. The fundus of such a bladder is seized with T-forceps and retracted away from the liver. The gall-bladder is then

¹ Archiv f. klinische Chirurgie, 1906, vol. lxxxii, p. 655.

² New York Medical Journal, 1906, vol. lxxxiv, p. 469.

³ Iowa Medical Journal, 1906, vol. xiii, p. 317.

⁴ New York Medical Journal, 1906, vol. lxxxiv, p. 579.

dissected free from the under surface of the liver, with the gauze-covered index finger, or a pair of blunt-pointed curved scissors. When the dissection has been carried down to the first S-curve of the cystic duct the snipping of the peritoneum must be followed by ligation of arterial twigs. The gall-bladder is now free. The cystic peritoneum is sutured together, covering a raw surface. A round hole is punched in the centre of a sterilized dental rubber dam measuring ten by twenty inches. The fundus of the distended bladder is drawn through the opening in the dam, which is gradually worked down until it lies upon the cystic duct. The upper corners of the dam are then clamped to the edges of the wound, while the lower portion of the dam reaches well over the patient's loin so that the gall-bladder can be incised, emptied, inspected, and irrigated

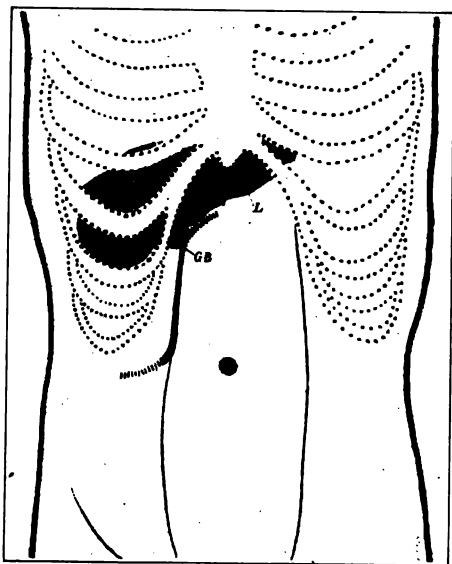


FIG. 47.—L, liver; GB, gall-bladder. First incision, solid line. Additional incisions, dotted lines. (Pond.)

without any risk of soiling the peritoneum. The opening in the gall-bladder is next closed by a clamp, the rubber dam is split and removed, and the operation completed in the usual manner. Crouse has twice utilized this method for the performance of an aseptic operation in difficult cases.

Indications for Cholecystectomy. Robson¹ gives the following indications for removal of the gall-bladder:

1. In cancer and other new-growths when the disease is local and limited.
2. In a contracted and useless gall-bladder, the result of repeated attacks of cholecystitis.

¹ British Medical Journal, 1906, vol. i, p 431

3. In a dilated or hypertrophied gall-bladder resulting from obstruction in the cystic duct: (a) always if resulting from stricture; (b) usually if resulting from impacted gallstones, which may have induced ulceration that will subsequently lead to stricture; (c) usually if resulting from kinking of the cystic duct or from adhesion.

4. In phlegmonous or gangrenous cholecystitis.

5. In empyema of the gall-bladder.

6. In calcareous degeneration of the gall-bladder.

7. In mucous fistula of the gall-bladder, the result of stricture or other obstruction of the cystic duct.

8. In gunshot or other serious injuries of the gall-bladder or cystic duct.

It is unnecessary in ordinary cholelithiasis when the gall-bladder is not seriously damaged and when the cystic duct is not ulcerated or narrowed by stricture.

It is contra-indicated in all cases which the surgeon cannot be certain that the deeper bile passages are free from obstruction; unless at the same time the cystic or common duct be short-circuited into the intestine.

Robson's technique is now as follows: 1. A vertical incision over the middle of the right rectus, the fibers of which are separated. The posterior sheath and peritoneum are divided vertically. If more room is needed, the upper end of the incision is prolonged into the space between the ensiform cartilage and the costal margin.

2. An assistant, whose fingers are covered with gauze to prevent slipping, lifts the lower edge of the liver and gall-bladder. This brings the biliary passages near the surface, and makes of the gall-bladder, cystic duct, and common duct almost a straight line, exposing also the duodenum and pancreas.

3. The surgeon has both hands free for manipulation and such operation as is indicated. A gauze pad is placed in the kidney pouch, another to the left to protect the stomach, and a third below to protect the rest of the abdomen.

4. If removal of the gall-bladder is decided upon the cystic duct (with the cystic artery) is seized near its entrance into the common duct with strong pressure forceps. It is clamped a little nearer the gall-bladder with a second pair of forceps and divided between them.

5. The gall-bladder is dissected from its bed by the finger or a blunt instrument, the peritoneum on either side being divided by scissors, one-third of an inch from its reflection on the liver. This dissection is usually made from the cut cystic duct outward.

6. Bleeding points are seized and ligated as is the cystic artery, the cut end of which can be plainly seen. The cystic end is ligated and buried beneath the peritoneum, which is sutured over the whole raw surface made by the removal of the gall-bladder.

7. In clean cases drainage is unnecessary. If drainage of the common duct is desired a soft-rubber catheter is inserted into the cut end of the cystic duct and the omentum placed between the tube and the viscera. The tube should be removed in a week.

8. The wound is closed in layers by catgut sutures, reinforced by a few chromic catgut sutures. The skin is sutured with silkworm or metal sutures.

Irrigation of the Hepatic Ducts. Erdmann,¹ after the removal of a gall-bladder containing much foul pus and a large stone and after the removal of other large stones from the common duct, found the hepatic ducts to be also blocked with stones and biliary detritus. Removal of these materials was followed by a gush of the same foul-smelling pus that was found in the gall-bladder. The hepatic ducts were then irrigated with saline solution until the fluid returned clear. During this flushing process the liver visibly rose and fell with the entrance and discharge of the solution. A drainage tube was left in the common duct. The temperature promptly fell from 104.6° to 100°. During the fifty hours following operation the tube drained fifteen ounces of dirty, foul-smelling bile. After this the character of the bile improved and the patient made a complete recovery.

Anastomosis between Common Duct and Duodenum. Rosenberger² removed the greatly thickened gall-bladder of a jaundiced patient, after he had demonstrated by pressure upon the same that the bile flowed into the duodenum. No stone nor tumor could be made out. The patient recovered, but the stools, which were of the normal color for a few days only, soon became clay-colored again and the jaundice returned. Nevertheless the wound, which had healed entirely, did not break down. Some three months after the operation the abdomen was reopened, the distended common duct was incised, the duodenum was also incised, and it was fully demonstrated that the opening between these two was absolutely closed by scar tissue. An anastomosis was therefore made between the common duct and the upper wall of the duodenum. Up to the time of report, ten months later, there was no return of the symptoms, nor any evidence that the liver had become infected through the unnatural anastomosis with the intestine. The postoperative condition of this patient was superior to that of three women upon whom Rosenberger performed anastomosis between the gall-bladder and intestine, so that he is inclined to regard it as the better of the two operations in suitable cases.

Anastomosis of Gall-bladder and Jejunum. Cordier³ found the common duct obstructed by cicatricial tissue, but no stones in the gall-bladder or any of the ducts. The cystic duct was patent. An anastomosis was

¹ Medical Record, 1906, vol. lxx, p. 441.

² Deutsche Zeitschrift f. Chirurgie, 1906, vol. lxxxv, p. 275.

³ Surgery, Gynecology and Obstetrics, 1906, vol. ii, p. 380

made between the gall-bladder and the jejunum (Fig. 48). The stools became bile-stained and jaundice disappeared in a few days, and the patient made a permanent recovery. Cordier was able to repeat this operation with equally good results in several other cases. The obstruction of the common duct in one was due to a local peritonitis set up by the kick of a horse, in another to chronic pancreatitis, and in other cases to local infection. In none of these cases were gallstones present at the time of operation.

Cysts of the Liver. Ikonnikow¹ speaks of the treatment which has been followed in 21 cases of non-parasitic cysts of the liver. In 6 cases the cyst was completely excised and the patients recovered. In 4 cases the cyst was punctured and the patients all died within a few months. In 11 cases the treatment was by incision and drainage, combined sometimes with partial excision; 8 of these patients were cured.



FIG. 48.—Demonstrating the technique of anastomosis between the gall-bladder and the jejunum. (Cordier.)

Carcinoma of the Gall-bladder and Ducts. Sherrill² is impressed with the frequency of primary carcinoma of the biliary passages, which is far greater, he thinks, than is generally recognized. Among 25 cases of diseases of the gall-bladder occurring in his private practice there were 4 proven and 2 suspected cases of primary carcinoma. Several foreign writers have already emphasized the importance of this subject. Thus, in 1905 Slade, in an article printed in the London *Lancet*, stated that cancer was found in 58.8 per cent. (10 in 17) of all cases of disease of gall-bladder with calculus in which at autopsy the wall of the gall-bladder showed inflammatory thickening. Slade believes that these figures probably underestimate the true proportion, since the microscope often shows carcinoma to exist when the naked eye only detects inflammation. Since he began in such cases to examine the wall of the

¹ Beilage Russ. Wratsch, 1906, Nr. 38.

² Annals of Surgery, 1906, vol. xlv, p. 866.

gall-bladder as a routine measure, he has in no instance failed to find indubitable cancer; hence he does not hesitate to suggest that had all cases been examined the percentage would have been very much nearer 100 than 58.

It is only fair to state that all writers have not agreed with Slade; thus Moynihan removed 18 gall-bladders whose walls were grossly



FIG. 49.—Carcinoma of gall-bladder. (Sherrill.)

thickened, and in only 1 of these specimens was malignant disease found after careful examination. He calls attention to the fact that only 2 cases have been recorded in which carcinoma of the gall-bladder has developed after cholecystostomy. It may be that drainage in these cases prevents the later development of malignant disease.

In the early stages the gall-bladder contains bile and usually stones;

as the cystic duct is narrowed the amount of bile is lessened and finally only a bile-stained mucus may remain. In other instances the cavity may be so completely filled that no space remains for fluid. When no fluid is present the glands of the wall will be found to be almost entirely obliterated. This was the condition in one of the patients operated upon (Figs. 49 and 50).

When growth progresses to the point of obstruction of the common or hepatic duct the tissues are promptly stained with bile coloring matter, the blood loses its power of coagulation, the ducts become dilated, sometimes to an enormous extent, and numerous gallstones may be found in the smaller ducts of the liver. When the obstruction lies above



FIG. 50.—Transverse section of same. (Sherrill.)

the entrance of the cystic duct the gall-bladder is small, but when the choledochus is occluded the gall-bladder is enlarged. This is an important point in determining upon the practicability of any operative procedure, as little can be hoped for when the hepatics are occluded. The kidneys very early show the pernicious effects of the toxic materials which reach them in the process of elimination. The blood, the heart, the spleen, and the general musculature of the body also show marked degenerative changes. Patients who have complete jaundice rarely live a year.

Carcinoma of the gall-bladder was reported in a man aged twenty-two

years, by Proescher.¹ The gall-bladder was filled with pus, and was about the size of an orange. A portion of it was removed, but its malignant character was not recognized until a microscopic examination was made. The patient made a good recovery, excepting that a fistula persisted, and thirteen weeks after the first operation a probe passed into the fistula detected a gallstone. No gallstones were found at the first operation. A second operation was performed, and the remains of the gall-bladder were extirpated. This is probably the youngest patient known to have been affected with carcinoma of the gall-bladder. Kaufmann reported its occurrence in a woman aged thirty-five years.

Surgical Treatment of Hepatic Ascites. O'Malley² rejects the complicated classification of cirrhosis put forth by some authors, and says that for practical purposes we can divide all into two groups: portal cirrhosis and biliary cirrhosis. In portal cirrhosis we find the hobnailed liver; hematemesis is common and it is observed early among the symptoms; ascites usually appears at the end of the disease, although death from toxemia may occur without ascites. Jaundice is not a marked characteristic, and whether the liver is large or small there is marked fibrosis. There is hypertrophy of the spleen, but this symptom is more prominent in biliary cirrhosis; the multilobular fibrosis consists in groups of lobules within a fibrous envelope, and the cirrhosis in the majority of cases is caused by toxins that are carried in by the portal vein. In biliary cirrhosis jaundice is constant and evident; hematemesis and ascites are rare; the liver is big and smooth and the fibrosis is monolobular or diffuse, or mixed; the spleen is large, often very large.

In the various forms of portal cirrhosis ascites becomes a grave complication. The majority of patients that die directly of cirrhosis have ascites. Ordinarily 50 per cent. of cirrhotic patients develop ascites, and when they die of cirrhosis directly the percentage is about 80.

The underlying fact in the surgical treatment of hepatic ascites is that the extravasation of serum into the abdominal cavity may commonly be averted by sending the venous blood through the veins of the abdominal wall instead of through the portal system. Some think that ascites is due to obstruction of the portal system in the liver, but probably in the majority of cases it is a result of toxemia, peritonitis, perihepatitis, or of cardiac failure. Be this as it may, fixation of the omentum, of the spleen, or of both to the abdominal wall has repeatedly removed the ascites by establishing a collateral circulation. This seems to have been the result in about one-third of the cases.

If the ascites is connected with peritonitis care must be exercised in determining the time for operation. When the peritonitis is acute, operations will almost always make the condition worse, and the prognosis becomes very grave. Again, if the ascitic fluid on tapping is

¹ Journal of the American Medical Association, 1907, vol. xlviii, p. 481.

² American Journal of the Medical Sciences, 1906, vol. cxxxi, p. 873.

heavy, or turbid, or contains much albumin; if there is elevation of temperature, pleuritic effusion, or abdominal pain, surgical intervention had better be deferred. Where there is no peritonitis one should operate at once, either by fixing the omentum or the spleen and omentum according to the nature of the cirrhosis.

In malarial ascites, and in ascites of Banti's disease, both omentum and spleen should be fixed.

Lloyd operated twice upon an ascitic patient in whom the ascites was due to atrophic cirrhosis. The omentum was freely attached to the abdominal wall; the necessary tapings for his ascites became less frequent, and the other symptoms improved. About a year afterward, at the request of the patient, a second operation was performed in the hope of removing the remaining symptoms by a still more extensive anastomosis. The adhesions between the omentum and abdominal wall were firm, and were not interfered with. The veins of the abdominal wall were of very great size. An additional portion of omentum was attached to the abdominal wall. Unfortunately the patient, who had chronic nephritis, died of uremia.

Ascites due to compression of the portal vein has been cured by *Talma's operation*. In the case reported by Meyer¹ the patient, a man aged thirty-nine years, had an attack diagnosed as gallstones, followed by ascites. This history was several times repeated, and the diagnosis was then changed to cirrhosis of the liver, with ascites. When the abdomen was opened it was found that the gall-bladder was much contracted and filled with small stones. There were no stones in the common duct or the hepatic ducts. The tissue about the portal vein was so dense that it seemed beyond a doubt that the ascites was due to obstruction of the portal vein. There was no evidence of cirrhosis of the liver. As the condition of the patient did not warrant excision of the gall-bladder, the omentum was brought out of the wound and arranged between the skin and deep fascia. The patient made a good recovery and the ascites entirely disappeared.

EPIPLOPEXY. Monro and McGregor² believe that the simpler forms of operation should be performed and at an early stage, before the glandular substance of the liver has been in large part destroyed. The occurrence of jaundice is generally held to indicate that the time for successful operation has passed. Marked cardiac and renal lesions, the occurrence of hemorrhages, and the presence of urobilin in the urine and pigmentation of the skin are other unfavorable signs.

HEPATOPEXY. Cheyne³ swabbed the upper surface of the liver with pure carbolic acid to promote adhesions to the diaphragm, and then inserted two silk stitches between the liver and diaphragm, one near the

¹ Beiträge zur klinischen Chirurgie, 1906, vol. 1, p. 576.

² Lancet, 1906, vol. i, p. 1239.

³ Ibid., p. 947.

suspensory ligament and the other far to the right. Other stitches were passed through the margin of the liver. The patient was kept in bed six weeks. The result was good.

THE SPLEEN.

Splenectomy for Rupture. Extirpation of the spleen for subcutaneous rupture is not an old operation, the first successful case having been recorded by Riegner in 1893. This was followed by many others, so that in 1902 Berger was able to collect data of 69 operations in which the healthy spleen had been removed for subcutaneous rupture. The mortality was 42 per cent., whereas the mortality following non-operative treatment of this injury was estimated at 92 per cent. Since that time Hörz¹ has collected reports of 35 additional cases, with a mortality after splenectomy of 29 per cent.

The early symptoms of rupture of the spleen are those of shock and abdominal hemorrhage. Hörz mentions an unusually pronounced contraction of the abdominal muscles as existing in many cases, but not in all, so that it cannot be depended upon as a pathognomonic symptom. Neither can an increased area of splenic dullness which is mentioned in some cases. In Hörz's case there was a moderate anemia immediately after the injury, the kick of a horse, and two hours later a sudden increase in the anemia. This has been mentioned by others. It may be due to the fact that the hemorrhage is held in check for a time by blood clots, and when they are dislodged the flow of blood is again free.

The object of treatment is the control of the hemorrhage. This is most certainly accomplished by splenectomy. Ligation of the bleeding vessels is likely to be followed by necrosis; at least this has been the invariable result in animal experiments.

Another plan is to control the hemorrhage by suture. In some cases this has succeeded, while other patients have bled to death from unobserved additional ruptures. Tamponade seems a quicker and better method than suture, according to the results thus far published. Yet Nötzel rejects this treatment as suitable only in case of small tears, or in cases in which the condition of the patient necessitates a speedy closure of the operation, or in those in which extensive adhesions make the removal of the spleen too long an operation.

It is not necessary to go into the blood changes which follow removal of the spleen, as they are well known, and they do not usually extend beyond a period of four or five months. As far as known there is no evidence that the removal of the spleen has been followed by a death which could be attributed to the loss of the organ. Many patients

¹ Beiträge zur klinischen Chirurgie, 1906, vol. I, p. 684.

have lived for years in good health without it, one for twenty-three years.

Flammer¹ reports 3 cases of splenectomy for subcutaneous rupture, with 2 deaths. One of these patients was not operated on till the third day, and besides the rupture of the spleen there was a fracture of four ribs and a pancreatic rupture. In the other fatal case operation was not performed till the fifth day, and was followed by peritonitis and double pneumonia. These fatal results are therefore an argument for prompt treatment rather than one against operation.

Simpson² found a mortality of 36 per cent. following 42 splenectomies performed in England, all since 1891.

SPLENECTOMY FOR BANTI'S DISEASE. Jaffe³ says it is of the highest importance to recognize that enlargement of the spleen may precede the other symptoms of Banti's disease, *i.e.*, a certain type of anemia, ascites and cirrhosis of the liver. However, removal of the spleen may stop the process even after the development of marked ascites, as was shown by one of Jaffe's cases. He believes that splenectomy may become a valuable method of preventing the development of some forms of cirrhosis of the liver.

Armstrong⁴ successfully removed the spleen in Banti's disease. The patient recovered completely and the blood became normal. An interesting feature was the occurrence of tetany twelve hours after the operation. The spasms lasted forty hours and then ceased completely.

Of 32 recorded splenectomies for Banti's disease there was a mortality in 9 cases, or 28 per cent. If a patient survives operation it appears that the blood will again become normal.

Abscess of the Spleen. Kirchmayr⁵ from a limited experience with splenic abscess and a careful review of the literature upon the subject, comes to the conclusion that puncture of a splenic abscess is a dangerous proceeding, and that free incision is the best method to follow. If the abscess is situated in the lower portion of the spleen, and there are already adhesions between the spleen and the parietal peritoneum, the procedure is simple enough. If such adhesions have not taken place, some operators drain the abscess at once; others prefer to delay this part of the operation until adhesions have formed.

It is also possible to remove the spleen without rupturing the abscess. If the abscess is concealed by the wall of the thorax, it may be opened after resection of a part of one or two ribs. In the most favorable cases this can be done without opening the pleural or peritoneal cavities. If adhesions have not formed between the two layers of the pleura, these may be sewed together and the opening of the splenic abscess

¹ Beiträge z. klin. Chir., 1906, vol. I, p. 684.

² Lancet, 1906, vol. II, p. 365.

³ Zentralblatt f. Chirurgie, 1906, Beilage, p. 112.

⁴ Lancet, 1906, vol. II, p. 733.

⁵ Deutsche Zeitschrift f. Chirurgie, 1906, vol. LXXXIII, p. 13.

postponed for a day or two, when the two layers of the pleura will have united. If the diagnosis is obscure, so that exploratory puncture is made to confirm it, and pus is found, some operators advocate leaving the needle in place and cutting down upon it as a guide; others withdraw the needle and operate as soon thereafter as possible. This was the procedure followed in Kirchmayr's case, and although the needle passed through the free pleural cavity no pus followed its withdrawal.

THE PANCREAS.

Differential Diagnosis in Acute Pancreatitis. Bornhaupt¹ says that acute pancreatitis must be differentiated from acute gastroduodenitis, poisoning, cholelithiasis, acute appendicitis, perforative peritonitis, fecal impaction, obstruction due to gallstones, tumors, bands and twists, mesenteric thrombosis, and impaction of a stone in the ureter.

It is easily differentiated from acute gastroduodenitis and poisoning by the constipation and retention of gas, as well as by the history. The characteristic pains of biliary and renal colic will differentiate if from impaction of these calculi. The history, the age of the patient, the normal temperature, and the absence of symptoms in the right iliac fossa differentiate if from acute appendicitis. Against a diagnosis of perforative peritonitis is the soft abdomen in the early stages, the normal temperature, the quiet full pulse, and the good appearance of the patient.

An obstruction of the intestine with involvement of the mesentery is ruled out by the good appearance of the patient and the normal, full pulse, as well as by the absence of fecal vomiting and disturbances of nutrition which accompany obstruction in the upper portion of the intestine. The character of the vomiting serves also to distinguish acute pancreatitis from other forms of intestinal obstruction, such as fecal impaction, tumor, bands, and volvulus. In all of these the vomiting gradually becomes worse, usually becoming fecal; whereas with pancreatitis it may be violent at first, but it often subsides, and is rarely fecal. Furthermore, peristalsis continues more or less normally, and there is never the palpable distended loop of intestine with exaggerated peristalsis, such as is often seen above an intestinal obstruction. The amount of water which can be injected into the rectum, often two to three quarts, speaks against an obstruction in the lower bowel.

Bornhaupt reports 2 cases treated by operation, one upon the fifth day of the disease and the other upon the third day. Both resulted fatally.

Acute Hemorrhagic Pancreatitis. C. H. Bunting² reports a fatal case of acute hemorrhagic pancreatitis due to obstruction of the bile papilla by a stone 3 mm. in diameter.

¹ Archiv f. klinische Chirurgie, 1907, vol. lxxxii, p. 209.

² Johns Hopkins Medical Bulletin, 1906, vol. xvii, p. 265.

Bile was found in the pancreatic duct, confirming the theory that the greater pressure in the common duct forces the bile into the pancreatic duct and sets up an acute inflammation in the pancreas. This confirms Opie's conclusion, in a recent paper, that *cholelithiasis* is the usual if not the only cause of acute hemorrhagic pancreatitis. He further says that "Whenever a biliary calculus passes through the diverticulum of Vater into the duodenum, the pancreas is subjected to the danger of injury, the character and extent of which are dependent on the size of the calculus and duration of its impaction."

Bunting's patient was a man, aged fifty-one years, who had not infrequent attacks of epigastric pain, with some constipation usually easily relieved. On July 25, 1906, he was seized with intense pain in the epigastrium, became collapsed, and showed considerable abdominal distention. On a diagnosis of intestinal obstruction the abdomen was opened. Some peritoneal adhesions were freed and the wound closed.

The pancreas was not examined. The patient died the following day. At autopsy the pancreas was seen to be large, swollen, and mottled. In the peripancreatic fat and in the mesentery were areas of fat necrosis. As these areas were not general in the abdomen they were overlooked at operation. The gall-bladder and bile passages were tense and much distended. On moderate pressure no bile flowed into the duodenum; but strong pressure drove the obstruction into the duodenum and a gush of bile followed.

The Treatment of Chronic Pancreatitis. Delagenière¹ reports his experience in 10 cases of pancreatic disease. He is of the opinion that the best operation in cases of chronic pancreatitis is the division of the common duct, and its implantation into the stomach, or into the duodenum at a little distance from the pancreas.

¹ Arch. prov. de chir., 1906, Nos. 4 and 5.



GYNECOLOGY.

By JOHN G. CLARK, M.D.

CANCER OF THE UTERUS.

The Crusade against Cancer. No subject is engaging more attention at the present time than cancer. The thought of the profession at large is upon this disease; experimental pathologists are everywhere watching its growth in lower animals; surgeons are striving by a perfection of operative technique to so thoroughly eradicate every vestige of cancer that it will not return and new theories concerning the etiology and the medical treatment are found on every hand. To facilitate investigation large sums of money have been set aside for the foundation of cancer institutes and for the support of those engaged in cancer research. Medical societies have enlisted their united efforts in order to spread broadcast the fullest information concerning the early diagnosis of this terrible disease. In this connection one recalls the Caroline Brewer Croft Cancer Commission of the Harvard Medical School at Boston, and the Cancer Research Laboratory at Buffalo, where investigations have been actively carried on for a number of years. The organization of the Imperial Cancer Research Fund of Great Britain and the activity manifested in Germany and in France by medical societies and by individuals are matters of common knowledge. During the past year a committee appointed by the Section on Obstetrics and Diseases of Women of the American Medical Association has advised that a communication be sent under separate cover to the individual members of each county medical society, advising him of the danger of overlooking or neglecting incipient cases. The work of a Committee appointed by the Vienna Medical Society has been recently published,¹ which appeals to every physician at large for an earlier recognition of cancer. The results of the early operative treatment and the early symptoms of cancer in the various parts of the body are given. It advises women to go to a physician for examination during the menopause, just as they are in the habit of having their teeth inspected from time to time by a dentist.

In Hungary² a national conference on the subject of cancer was held in Budapest in November. Dollinger, the President of the Cancer

¹ Abstract in Journal of the American Medical Association, vol. xlvii, No. 6, p. 468; Wien. klin. Woch., Band xviii, Nr. 52.

² Journal of the American Medical Association, vol. xlvii, No. 26, p. 2169.

Committee of the Budapest Medical Association, is the leading spirit in this national campaign. He made an official report on the results of the collective inquiry, in regard to cases of cancer, undertaken October 15, 1904. The director of the bureau of statistics also delivered an address on the comparison of the German and Hungarian collective inquiries, both in regard to the methods and the results of the investigation. The medical profession in Hungary is making an extra effort to collect interesting material for the international congress to meet at Budapest in 1909.

A local committee has been formed in Natal¹ to coöperate with the Imperial Cancer Research Fund. The occurrence of malignant disease among such colored races as inhabit the colony and among birds, reptiles, fish, and the lower animals is being investigated. All physicians and veterinarians will be asked to give their assistance in the work, and an endeavor will also be made to enlist in this movement the sympathies of naturalists and sportsmen. The *British Medical Journal* states that all specimens suspected of cancerous disease are examined free of charge at the government laboratories at Pietermaritzburg.

Voelcker² reports that on September 25, 1906, the first cancer institute in Germany was opened at Heidelberg. It was founded largely through the efforts of Czerny. It consists of a cancer hospital and a laboratory where a thorough study of the specimens removed in the hospital will be possible, and experiments on the lower animals, etc., can be carried out.

In France Dr. Henri de Rothschild has presented his check for 20,000 francs to Poirier as a nucleus for a fund to erect and maintain a cancer institute.

Increase of Cancer. There is a very widespread opinion that the number of cases of cancer is increasing and this is considered by many as an evidence that cancer is caused by a parasite. By others it is held that modern habits of life predispose to this disease. Whether there really are more cases of cancer now than formerly in ratio to the population is difficult to decide. If such an increase does exist it can be explained by the undoubted increase in human longevity. The latter, Bryant³ affirms, adds many to the list of those who, from augmented years, fall within the age limit of cancer. It is logical to infer that the larger the number of people beyond the age of forty the greater will be the number of those who fall victims to a malignant disorder.

Investigating this subject from the vital statistics of Philadelphia Bland⁴ found that in 1879, with a population of 846,980, there were 362 deaths from carcinoma, while in 1904, with a population of 1,408,000,

¹ Journal of the American Medical Association, vol. xlvi, No. 7, p. 521

² Münch. med. Woch., Bd., liii, Nr. 39, S. 1919.

³ Journal of the American Medical Association, vol. xlvi, No. 23, p. 1740,

⁴ Surgery, Gynecology, and Obstetrics, vol. iii, No. 5, p. 638,

there were 937 cases. It cannot be questioned but that at the present time the relative frequency of cancer cases is greater than in former years. This may depend, however, upon an increase in the greater frequency of a correct diagnosis, or in a diminution of the death rate from the infectious diseases which has resulted from quarantine. The fact too that at the present day cases of cancer occurring in the country are sent to the more pretentious city, where surgical help may be obtained, may account for the relative increase which has been observed. As Bryant says, "a preconceived notion relative to a disease, or a prejudiced opinion regarding it, can usually gain substantial comfort from the study of plastic statistics."

Barlow and Taylor¹ publish figures from the St. George and the Middlesex Hospitals, which they say show that cancer is on the increase. They selected a careful and a satisfactory method of deduction, but, for reasons which cannot be detailed here, reached their conclusions by questionable estimates. Fox² in a very conservative article says that Dr. Muirhead found a real increase in the incidence of cancer upon assured lives. In the Scottish Widows' funds, from 1874 to 1894, the ratio of cancer death increased from 4.9 per cent. of all deaths during the first seven years of the period to 6.9 per cent. of deaths during the last seven years. Even this, I think, could be explained by the greater frequency of a correct diagnosis.

The Cause of Cancer. It is certainly evident, according to Bryant,³ that the continuous occurrence of cancer, regardless of preventive measures and of human understanding, is controlled by influences of such subtle kind as thus far to perplex, beyond satisfactory solution, the minds of the most acute observers. In connection with this remark⁴ it is stated that, notwithstanding all that has been and is being done, the vast amount of theorizing and the frequent announcement of alleged discoveries, the true nature of malignant disease is still an elusive mystery. The more it is studied the more is learned of its extent and of its importance, the more apparent becomes our ignorance of the essential facts of its real nature and origin. It really is questionable whether the origin of cancer will ever be thoroughly understood.⁵ If a parasite should be discovered, then an explanation would be easy. If cancer depends on biological grounds, its nature may be as hard to fathom as the intricate physiology of cellular activity itself. Nevertheless, the difficulty of the problem is encouraging further efforts in this direction, and Schmidt⁶ believes that he has discovered the parasite of carcinoma in an ameba which he found in a mold obtained from new-growths. Amebas in

¹ *Medical Examiner and Practitioner* (New York), December, 1905, p. 719.

² *Ibid.*, p. 728.

³ *Journal of the American Medical Association*, vol. xlv, No. 23, p. 1740.

⁴ *Ibid.*, p. 1770.

⁵ *Ibid.*, No. 9, p. 657

⁶ *Münch. med. Woch.*, liii, 4, 162.

their life circle usually occupy an intermediate host, either an insect or a low form of vegetable life. By injecting this mold containing the amebas into 109 white mice he obtained 5 positive results. The tumor appeared on the average in about five months at the original site of the inoculation.

For various reasons (epidemic of pneumonia and the use of the animals for other purposes after two or three months in the first cases) the author thinks his 5 successful inoculations should be considered as occurring in 80 cases. As to whether these tumors (all histologically carcinomas or the so-called Jensen tumor) were spontaneous, he says that the English committee on cancer research reported but 12 cases of spontaneous cancer in 30,000 mice—that is, 1 in 2500. For this reason he thinks his tumors cannot be regarded as spontaneous. Furthermore, spontaneous growths are almost invariably observed in females and in old animals, whereas 3 of the author's successful inoculations were in males, and all of the animals were young. The author also, reasoning from analogy, and bearing in mind the effect of tuberculin, injected into 5 patients a dead culture of the mold containing amebas. The injection was subcutaneous, at some distance from the tumor, and the dose varied from 0.1 mg. to 5 mg. In 2 there was a local reaction; in 1, because of the deepness of the tumor, this could not be ascertained. The highest temperatures reached by the cases were 102.2° F., 102.7° F., 100.5° F., and 101.5° F. In the first case (postoperative) the temperature had been normal for two days before the first injection was given. In the second the temperature had averaged 100.4° F., before inoculation; the pyrexia was accounted for by a suppurating incision. The temperature of the third case previous to injection is not given; it was an ulcerated, recurrent epithelioma of the lip. In the fourth, which was an ulcerating sarcoma, the temperature had not been taken before the experiments were made. In this case, on the fourth day, an injection of 10 mg. was given. There was not only no reaction, but indeed a drop occurred in the temperature. There was a fifth case in which no reaction was observed at all, and for this reason it was considered to be non-cancerous. At operation the diagnosis was confirmed, tuberculous epididymitis being found.

So many organisms have been said to be the cancer germ that we are loath to put much faith in the claims of the discoverer of a new one. As Beitzke¹ correctly says, the claims of Schmidt are yet to be investigated and then proved or disproved.

The actual worth of so many researches is spoiled by the imagination of the enthusiastic observer. This is indicated plainly by a conservative study like that of Paine and Morgan.² They have investigated a series of 44 cases at the Cancer Hospital of London during the past year.

¹ Berlin. klin. Woch., xliii, Nr. 30, S. 1017.

² Lancet, April 7, 1906, p. 955.

Their investigations concerned especially the *Micrococcus neoformans* of Doyen. This organism was regarded by Doyen as the cause of cancer. He prepared from it anticancerous vaccines by attenuating and exhalting the virulence of the organism. He also obtained an antitoxin from the horse. He claimed that a large proportion of cases were cured by the treatment he suggested. The authors were supplied by Doyen with vaccine and serum of the kind he had used, and employed it in a series of 9 cases, most of which were seen by Doyen himself and regarded by him as suitable for treatment. As the authors wanted to be sure to ascertain the effect of the serum, no operative treatment was employed in connection with the serum injections. In this they differed from Doyen, who used the two combined. There was no improvement in any of the cases. In 2 of them there were severe constitutional disturbances characterized by heart-failure.

The authors also examined 32 cases of cancer of the breast and found an organism corresponding to the one described by Doyen in only 8 of them. They used Doyen's technique and a culture media especially advocated by him, viz., a watery extract of the cow's udder during lactation, to which peptone and salt are added, and the whole rendered sterile by heat in the autoclave at 130° C. The authors also studied a large number of tumors microscopically. They found the *Micrococcus neoformans* by no means constantly present. In a large number of the cases none were found. In cases where organisms appeared they were of various kinds, either cocci or bacilli. No one particular organism was found. They studied further the cases in which cocci existed and endeavored to ascertain the nature of the organism, the extent to which it was present, and the relationship of the organism to the special cellular elements of the growth. In conclusion they say:

1. Micrococci, when found in the tumors, appeared in the form of solitary cocci and diplococci; and as these are the morphological appearances which micrococci assume in tissues when not in a state of active growth, it was consequently impossible to identify them by this method of examination with any one particular species of micrococcus.

2. The organisms were present in very small numbers and they were no greater in number in the rapidly growing tumors than in the slowly growing ones.

3. Owing to the small number of organisms in such tumors, and the consequent difficulty of detecting them microscopically, an endeavor was made to reinforce their numbers by the method of incubating the tissues at the body temperature. The authors did not find that the micrococci bore any special relation to the cells of the growth; sometimes they were intracellular, but more often extracellular.

With a view of ascertaining the pathogenic action of the *Micrococcus neoformans* on animals, a series of experiments were conducted at the Brown institution. The method of inoculation was intraperitoneal, as

used by Doyen. In all 200 animals, 110 mice and 90 rats, were inoculated. The organisms used were obtained from four different tumors: carcinoma of the breast, carcinoma of the neck, carcinoma of the ovary, and melanotic sarcoma. The organisms in the 2 latter cases had been isolated by Doyen, who supplied the authors with subcultures. In none of the animals did any simple or malignant tumor follow the inoculation. The animal which died exhibited the inflammatory lesions which would be expected from inoculations of ordinary cocci. The authors had the privilege of examining in Doyen's laboratory the so-called tumors obtained by him in his experiments. Most of these tumors appeared, on microscopic examination, to be of an inflammatory nature. Some of them bore microscopically a superficial resemblance to carcinoma or sarcoma, but such areas were very small and were unaccompanied by secondary deposits, wasting, or other clinical attributes of malignant disease. They do not believe that Doyen has produced cancer in rats or in mice in a single instance.

Notwithstanding that there is no proof whatever to support his argument, Butler¹ insists that carcinoma is a parasitic disease, not in the limited sense in which the term has been used of late, as synonymous with infectious, but in the larger and wider sense in which it used to be, and should always be employed—to express the fact of one organism living at the expense of another organism, each pursuing its otherwise separate and independent existence. The organism which lives upon the other is the parasite, and the organism on which it lives is the host. He further makes some inaccurate statements and reasons from them as follows: "It suffices for my purpose that modern observation, under the most favorable conditions, shows that there is no transformation of normal cells into carcinoma cells in the course of the growth of the disease, and that the stroma is not developed from the cells of the carcinoma. And, for the present, there is no direct evidence that the cells of the youngest carcinoma are derived from the cells of the part in which it first appears. The carcinoma cell is an independent organism, like many a protozoon; it lives a life which is wholly independent and proper to itself, as a parasite in the body of the animal which is affected, deriving its nourishment from and doing nothing to repay the host for the substance of which it robs him." Such assertions are purely speculative and do nothing but increase interest in the search after the parasite of cancer.

Poppelman,² in studying all the cases of cancer occurring during the past twenty years in a town of eight thousand inhabitants, found that dwellings which stood near water showed the greatest proportion of cancer cases. He does not draw sweeping conclusions, but advises similar studies of other towns.

¹ British Medical Journal, December 16, 1905, p. 1565.

² Zeitschr. f. Krebsforsch., Band iv, Heft 1, S. 39.

Weinberg and Gastpar,¹ after an extensive observation in Stuttgart, conclude that a direct infection from cancer rarely occurs, and that no definite conclusions can be drawn from a study of the distribution of the disease either in parts of the town or in certain houses.

Borrmann² observes that none of the so-called parasites, which have been observed histologically in cancer, have been found in young cancers. From this he argues that the bodies taken to be parasites are really the result of degenerative processes in old cancer cells, and as these processes do not occur in young tumors the so-called parasites are not found in them.

Among the most consistently reliable observers is Pick. He has recently made a most thorough observation³ of the malignant tumors which are found in *brook trout*. From 10 cases of this sort which he has just studied, and from previous work in this line, he concludes that malignant goitre of the thyroid gland occurs in brook trout as an endemic disease, appearing in this species of fish in certain hatcheries. It is found as a rule in the tanks of certain hatcheries, in the same species of trout and at a certain age of the hatch. Among the different species in a hatchery the disease may be entirely confined to the pool of a particular form. Sporadic cases, however, occur, and wild trout may be affected.

From present knowledge it may be said that fish over two years old are affected, and the percentage of the hatch involved varies between 2 and 7 per cent. Although all varieties of trout may be affected, and the same external conditions obtain in all hatcheries (renewals by wild trout), the disease is limited to particular lands and under certain circumstances to a certain species of the hatchery. This throws light on the endemic character of the disease, and gives importance to the local conditions surrounding the affected trout. That the tumors are malignant is shown by their unrestrained power of penetration, not only into the soft but also into the skeletal parts of the throat. Histologically the tumors resemble the epithelial tumors of the mammaræ occurring in mice. There is also an extraordinary analogy between them and the malignant thyroid tumors of man. They are real carcinoma.

The endemic characteristics of these tumors occurring in trout are not attributed by Pick to a parasitic origin. Bearing in mind the practical facts concerning the distribution of simple and malignant goitre in man, and the histological structure of the malignant goitre in trout, it may be assumed, he says, that a primary, simple hyperplastic goitre may undergo malignant degeneration in consequence of some noxious influence. This influence may lie in the composition of the water in the hatchery pools or it may depend on grounds as yet beyond our knowledge.

¹ Zeitschr. f. Krebsforsch., Band iv, Heft 1, S. 18.

² Münch. med. Woch., lii, 42.

³ Berlin. klin. Woch., xlii, 46, S. 1435; 47, S. 1477; 48, S. 1498; 49, S. 1532.

Hollister¹ has reported a fact which may be taken to have considerable significance. He examined the spleen in 114 cases of cancer which came to autopsy. There were 61 stomach and 19 esophageal cases, and the rest comprised cancers of the bronchial tubes, rectum, pancreas, gall-bladder, gall-ducts, sigmoid flexure, uterus, breasts, and bladder.

In 92 of these there was either no hypertrophy of the spleen or the organ was atrophied. In 22 cases only was it enlarged and in a large majority of these cases the enlargement was due to chronic congestion in the portal region or to severe general sepsis. In a very few cases there was actual carcinomatous metastasis to the spleen. This result is in line with the previously expressed opinion of Oestreich, viz., "In uncomplicated malignant tumors an enlargement of the spleen is never found. Each time the spleen is small, mostly atrophic. This, it seems to me, would speak in the most positive way against a parasitic cause of malignant tumors, because in all the known infections the spleen is more or less involved."

Many other theories have been expressed concerning the cause of cancer.

Mouse Experiments. There sometimes develops spontaneously in the breasts of female white mice a tumor of a cancerous type with which, at the present time, a host of experimentalists are engaged. These tumors have been transferred by Leo Loeb, Morau (1894), Jensen, Ehrlich, and others from one mouse to another. The pioneers in this work were Leo Loeb and Morau, but Jensen made the first large series of experiments. It is of course well known that the successful inoculation of cancer from man to the lower animals has not been accomplished. But these tumors occurring spontaneously in mice may be inoculated under certain conditions from one animal to another. In this way experimental pathologists everywhere are investigating the subject of the growth of cancer, the effect which certain serums have upon it, and the question of a natural and an artificial immunity.

As all of these researches are valuable only as they enlighten mankind upon the subject of cancer, the question of Michaelis² as to whether these growths are really cancerous is very pertinent. Are these mouse tumors, he asks, of the same nature as is cancer in man? He considers them to be rather midway between benign and malignant growths, with a tendency toward the malignant side. Mouse cancers are noteworthy from the fact that they are usually well encapsulated, so that they can be readily shelled out by dry dissection. They very rarely show any infiltration of the surrounding tissues and metastases have been observed with certainty in but 2 instances. When extirpated they recur if even a few cells are left, but he has seen them permanently cured by full extirpation. Michaelis experimented with some mice inoculated

¹ Deutsche med. Wochenschr., Band xxxii, Nr. 37.

² Zeitschr. f. Krebsforsch., Band iv, Heft 1, S. 1.

by Jensen and with twenty mice of his own which had spontaneous tumor. He found that the race of mice susceptible to the Jensen tumor was not susceptible to his, and that his race of mice was not susceptible to the Jensen tumor.

Ehrlich¹ says that he has had 230 cases of spontaneous tumor growth in the last few years at his institute in Frankfort. As primary tumor development is not at all frequent this is an enormous material. All of the growths occurred in female mice and affected the breast. In the transplantation of these growths Ehrlich found that in a large percentage of the first animals inoculated there would be a negative result, so that it was necessary to inoculate a number of animals each time, twenty or thirty. As the tumor was transplanted from mouse to mouse in which the inoculations were successful, it increased in virulence so that finally almost any mouse inoculated would be susceptible. This virulent strain is fatal for almost every mouse, while the Paris strain kills but 10 per cent. and the Jensen strain from 30 to 40 per cent.

Influence of Diet. Wade² believes that cancer is due to senile changes in the nerve ending or in the cells or perhaps in both combined. Reburn³ believes that senility is a large factor in cancer or, expressed in other terms, he believes retrograde metamorphoses predispose to it. Combined with this, the diet has a large influence. Cancer, he says, is comparatively rare in hot climates, and especially in countries where the diet of the inhabitants is composed chiefly of rice or other starchy foods. Cancer is very prevalent wherever animal food is largely consumed, and the number of cases increases in ratio to the increase of the consumption of nitrogenous food.

Bainbridge,⁴ however, takes a different view. He thinks the testimony in regard to the influence of diet is conflicting, from those who believe it traceable to a uric-acid diathesis, advocating a vegetable diet as a preventive, to Senn, who finds that the Eskimos, living on an almost exclusive raw meat diet, are almost immune from tumors of all kinds. There is a variation of opinion. He further notes that the principal increase in cancer involves the alimentary tract; in 1900 there were 9000 deaths from cancer of the stomach in the United States. According to Mayo 30 per cent. of all cancers affect the stomach. What part diet may have in the production of cancer is a question of interest. If diet does influence the disease, it is probably effected by persistent indiscretions in food and in drink. Such a cause of cancer might be considered as a form of repeated irritation, chemical or traumatic, and would be more or less analogous to the biogenetic theory of Israel reported in

¹ *Zeitschr. f. Aerzte Fortbildung.*, iii, 7, 1906; *Berlin. klin. Woch.*, 1906, Nr. 2.

² *British Medical Journal*, March 17, 1906.

³ *Journal of the American Medical Association*, vol. xlvii, No. 19, p. 1539.

⁴ *Medical Record* (New York), September 1, 1906, p. 332.

PROGRESSIVE MEDICINE of 1903. Bryant¹ affirms that 80 per cent. of all cases of cancer in man affects the gastro-intestinal canal, and that 80 per cent. in all cases of woman involve the reproductive organs, including the breast. Can this be explained on the basis of chemical or traumatic irritation? It would seem possible, when the differences in the diet and the drink of the two sexes is observed, and in the much more extensive reproductive functions in woman. Bryant² also says that the liability in both sexes to cancer of the gastro-intestinal tract gradually and quite uniformly diminishes from the stomach downward toward the external opening, but not including it.

Menne³ discusses the influence of external *trauma* as a predisposing cause of cancer of the stomach, and gives the details of 10 cases. He thinks traumatism may either originate the growth or start embryonal rests into active multiplication.

Fischer⁴ injected the stain known as "Scharlach R" mixed with olive oil into the subcutaneous tissues of a rabbit's ear. This produced in a few days a proliferation of the epithelium which extended downward, sometimes penetrating the cartilage. He believes that the result was due, not to any simple mechanical irritation, but to a specific effect of the "Scharlach R" upon the epithelial cells; and he thinks that there are other substances which may have the same effect. He builds a theory upon this which is in part closely related to Cohnheim's theory. Certain collections of cells or "tumor matrices" exist in the body, being either embryonal or postembryonal in origin. These may be acted upon by certain chemotactic substances circulating in the blood which have no effect on the normal body cells.

The most startling as well as the most unique theory in regard to the cause of cancer is that elaborated by Beard.⁵ This author has given his opinion that cancer develops from the displacement of germ cells occurring in the development of the embryo. He calls them asexual cells and found in fish that their displacement and subsequent development was a frequent cause of malignant growths. He also observed the relation between the growth of the pancreas and the disappearance of the trophoblast in fishes, and from this elaborated the trypsin treatment of cancer. This latter phase of the matter will be taken up subsequently.

It is difficult to understand from a perusal of Beard's articles just what his theory is; certainly his explanation is not a lucid one. In the same number of the *Lancet* in which his latest article appears the editor⁶

¹ Journal of the American Medical Association, vol. xlv, No. 23, p. 1740.

² Ibid., vol. xlvii, No. 19, p. 1566.

³ Deutsch. Zeitschr. f. Chirurg., Band lxxxi, Heft 4, S. 374.

⁴ Münch. med. Woch., liii, S. 2041.

⁵ *Lancet*, June 21, 1902, p. 1758; October 29, 1904, p. 1200; February 4, 1905, p. 281; New York Medical Record, June 23, 1906, p. 1020.

⁶ *Lancet*, February 4, 1905, p. 303.

remarks: "The biological nature of some aspects of the cancer problem has been frequently urged in our columns, but with every desire to encourage the serious biological investigation of disease, it is not always easy to discriminate between the essentially biological papers which possess the practical medical bearings claimed for them and those which do not. This is all the more difficult when the customary medical nomenclature is replaced by the technical terminology of the biologist and the familiar pathological problem is presented dressed up in biological phraseology.

"The present contribution (Beard's paper) is itself the best commentary and criticism upon the two previous articles, and its character makes it incumbent upon us to state clearly the illogical reasoning upon which Dr. Beard's conclusions are based, seeing that they have already received qualified acceptance from some pathologists who probably would not subscribe to a bald statement of the fundamental conceptions upon which a fantastic but seemingly logical superstructure has been raised. This given cell hypothesis of cancer has been expounded in terms of the conception its author entertains of the nature of vertebrate development. It must be clearly understood that the truth or the falsity of this hypothesis of cancer is dependent on the truth or falsity of the embryological theories upon which it is based. These theories lead Dr. Beard to affirm in a former paper that they necessitated the limitation of carcinoma to the mammalia, in which division of the animal kingdom it was a 'sequel to uterine gestation.' This prophecy has not been fulfilled. The embryological views have not been modified, but other investigators have shown that carcinoma is common to all vertebrates and the germ-cell hypothesis of cancer has quietly accommodated itself accordingly. Dr. Beard never tires of reminding us that his embryological conclusions do not find general acceptance.

"After due inquiry into their nature we must confess that much of what is fact for Dr. Beard remains very hypothetical to us. Our confidence in his conclusions is not restored by the assurance 'that all the wonderful and infinite variety of animate nature' (including the neoplasms) 'has its fount in the unconscious memories of germ cells.' Interpretation of all the facts of embryology in accordance with this view is without our province; but the unconscious memory of the germ cell—that it has had something to do with a chorion in past generations—leads us to recognize that for Dr. Beard all malignant new-growths are merely chorion (trophoblast, blastoderm, asexual generation of Dr. Beard), which masquerades as a squamous-celled epithelioma or in the guise of the columnar cells of a malignant adenoma, or indeed in the garb of any one of the many histological groups of the carcinomas and sarcomas. The chorion is alleged to have unlimited powers of growth and to take on the histological character of the tissue in which it is growing, provided that it develops without an embryo. The cancerous chorion naturally

arises anywhere in the body, for it is said that the germ cells do not find their way into the sexual organs. They are scattered through the tissues, where they lie dormant or grow, and we are at once brought face to face with all the old difficulties associated with 'Cohnheim's rests.' The difficulties are but shifted back in the scale of development, from the embryonic tissues to the germ cells. The 'unconscious memory' of the germ cell is, however, elastic. It remembers that it has got to produce a chorion which has conveniently to mimic the tissues surrounding its nidus, but the chorion breeds true to the character of the primary nidus in metastases. In assuming for the chorion unlimited power of growth, the germ cell—and Dr. Beard with it—forgets that chorion does not possess such inherent powers of growth any more than does any other tissue of the embryo or the adult. On the contrary, the assumption of such unlimited powers of growth is contradicted by accumulated pathological and experimental experience.

"In this connection it is only necessary to refer to the very recent work of Schmorl on the frequency with which chorionic villi become arrested in the vessels of the lungs during pregnancy, without evincing any signs of growth. The 'unconscious memory' of the germ cell is patent for evil. It conjures up 'an ancestral acid peptic' digestion for the chorion, and endows it with 'an acid and eroding action,' for only by such could a cancer erode bone. We wonder if the aortic aneurysm which erodes its way through the sternum or the vertebral column owes this power to the same unconscious memory. In short, Dr. Beard passes from one conjecture to another. He begins by views on embryology, which on his own showing are not generally accepted by embryologists. He goes on to express opinions on the histology and the pathology of cancer which are not in accordance with known truths, and launches into the realms of therapeutics with assertions about the actions of ferments which would inevitably cause the rejection of a candidate in physiology. We are anxious to encourage the serious biological investigation of cancer and we trust that we are doing so by eliminating from the hypotheses worthy of further consideration one characterized by more wild speculations in more fields of knowledge than any other with which we are acquainted."

Symptoms of Cancer. EVIL OF PROCRASTINATION. Notwithstanding the almost innumerable articles which have recently been published on cancer of the uterus, there has not been one pathognomonic sign or symptom discovered which will point unerringly or even with approximate certainty to the onset of this disease. The established fact that more than 65 per cent. of cases of cancer are turned away from our hospitals as inoperable, and that of those presumably operable only a very small percentage are ultimately cured, is a very serious reflection on our ability to make an early diagnosis in these cases.

As the matter stands the blame largely, but not wholly, rests on our

profession; for our women patients too often pursue such a procrastinating policy that nothing can be done by the time they consult a physician. While we usually attribute our bad results to this source, we cannot support it by the past history of medicine, for it is a well-known fact that medical knowledge of one generation becomes a lay possession of the next. The root of this evil, therefore, comes directly home to us, for even today many physicians are all too much inclined to attribute every nervous and physical deviation of women after thirty-five years of age to the ills of the menopause, and consequently assume that time will slowly but surely correct them.

In approaching the question of symptomatology,¹ we must, therefore, clear the ground of all this rubbish before we can hope to make progress. The surgical world is at present pursuing the most radical operative policy against cancer, and, with certain limitations, I am in full accord with this policy. This line of action has been pushed to its farthest limit, and yet our results under present conditions are notoriously bad. The limit to further progress, so far as devising more radical operations, has been reached, and the chief aim in the future must be to educate our consciences up to the point of feeling that we are the most malicious of malpractitioners if we pass over lightly the slightest deviation of the menstrual function in women of the cancerous age, or of treating locally, as an ulcer, a condition of the cervix which may be cancer. Still more our energies must be turned toward our patients in impressing on them the serious dangers of delay in consulting a physician after any of these minor symptoms appear.

Fortunately, the professional lethargy which has so retarded this advancement is disappearing, and while the fact is well established that there are no characteristic symptoms of cancer of the uterus there are, nevertheless, symptoms which occur sufficiently early to suggest the danger and require a prompt investigation. If the profession generally assumes this position we shall soon find the same gratifying rise in the operability of these cases that has already been noted in Germany under the educational policy inaugurated by Winter and pushed so vigorously as a national medical policy by German gynecologists. The mass of literature on the various operations on cancer points unerringly to the curability of cancer in its early stage.

While it is to be regretted that there are no early pathognomonic signs, this very deficiency should put every physician on his guard and cause him to investigate the comparatively meager symptoms present in many cases. While the alarmist's viewpoint is usually to be decried in medicine, for in the end it will work more harm than good, in cases of cancer of the uterus there is little danger from this attitude, for if a suspicion of the disease has been aroused by atypical symptoms it may

¹ Journal of the American Medical Association, vol. xlvii, No. 23, p. 1865.

readily be set aside or confirmed by an examination. If the suspicion is confirmed a precipitate operation should be urged; if, on the other hand, no cancer is found, the patient is all the happier and all the safer for this knowledge. Under these conditions she will not become introspective if she is once assured there is no cancer. Now that the more ignorant as well as the more intelligent women are coming to learn that an operation is the only hope held out for their cure, the very fact that this course is not insisted on, after the examination is made, will at once allay their fears as to the presence of the disease.

SYMPTOMATOLOGY. The first of the older precepts which must be utterly cast out in teaching, and in consultation with patients, is that the irregular discharges of the menopause are in any sense typical of a normal condition. This period in a woman's life should come about as a natural diminution with cessation or as an abrupt cessation, and never with irregular floodings or leucorrheal discharge. Both of the latter are evidences of a pathological state; and, while in many cases this may be self-limiting and may terminate without serious effects on the patient, no more unfortunate error can be made than to proceed contentedly on this assumption, and when it finally ceases cheerily to tell the patient that your prediction is now confirmed. This viewpoint, which may be correct in one case, will possibly condemn others, for all women naturally shrink from examination, and if Dr. A. in his foolhardy optimism has thus assured Mrs. B., she will advertise this fact to her neighbors, who under similar circumstances either defer seeing a physician until an incurable stage of cancer is reached, or even more foolishly consult Dr. A., who ignorantly passes over the symptoms with the same criminal optimism, and in this false security the patient is professionally guided to her horrible fate. Let us, therefore, throw aside once and for all this fetich of the harmlessness of the atypical discharges of the menopause. Also the terminal symptoms of cancer, such as pain, profuse, foul-smelling discharge, cachexia, and excessive hemorrhage, should only be considered of prognostic rather than of diagnostic worth, for, unhappily, they usually indicate an inoperable stage of the growth. It is the slight symptoms that are of value and the physician, therefore, who allows a patient under his care with a simple leucorrhea or an irregular menstrual discharge to drift on to the more pronounced symptoms is, to say the least, ignorant of his responsibilities.

Another fallacy in cancer is the *hereditary theory*. Many a physician in the past, even in the face of well-defined symptoms, has attributed them to the menopause solely because he is sure there is no hereditary tendency. To clear up the question of symptomatology, we should at once discard heredity as a factor, for I am certain that of all of the diseases which are usually attributed to this origin this has the least foundation in statistical facts.

While heredity practically plays very little part in the diagnostic

consideration of cancer, the importance of recognizing the fact that cancer is a disease of midlife cannot be too strongly emphasized. At least 90 per cent. of these cases occur between forty and fifty years of age. After sixty years has past the danger is not greater than that of a woman less than twenty-three years of age. Another fact on which stress has constantly been laid as a causative factor in the production of cancer is the injuries of childbirth. Sampson has shown that in 412 cases only 3 per cent. had not been pregnant.

As will be seen from my foregoing remarks, our chief object must be to revise the symptomatic structure of the past, for of all diseases this is the flimsiest. To reiterate my opening sentence, there are no pathognomonic signs or symptoms, and the quicker the physician recognizes this fact the more frequently will he detect this disease. The *suggestive signs* which should be investigated by an exhaustive examination in any woman between twenty-two years of age and the climacteric period are:

1. Any deviation of the menstrual period in the way of an intermenstrual discharge, especially in women beyond thirty years of age. The most suspicious of these are: (a) a mere show after slight exertion, defecation, or coitus; (b) increasing length of the period even if only one day more than has been her established habit. Every woman is a law to herself in this respect.

2. An exacerbation in amount or change in character of the discharge in a woman who may have had a simple leucorrhea for months or years. Of these changes a free, aqueous, acrid, or blood-tinged discharge is especially portentous.

3. A leucorrheal discharge in a patient who has never had it before.

4. Every atypical discharge in a woman after the menopause. These cases are especially liable to cancer and should, if possible, be even more exhaustively examined.

5. Pelvic pain of more than a few days' duration should always be an urgent reason for examination, although it is very seldom an early symptom of cancer.

Examination Necessary. From these statements it is very evident that the chief stress in symptomatology points not to a diagnosis, but to the urgent necessity for an examination, for on this almost exclusively the diagnosis must rest. As these cases have presented themselves at our clinics and those of Europe, the gross pathological appearances are so characteristic that the mere novice, if he has seen but one case or has read carefully the description of these lesions, will almost unerringly make the diagnosis.

In this connection I would also protest against the use of the word "ulcer of the womb," for many a poor woman has paid her professional fee thrice weekly to some ignorant or wilful practitioner for treatment of an ulcer which, from its very beginning, was a cancer. Dr. Emmet

pointed out many years ago that there are very few benign ulcers or erosions of a lacerated cervix. If it is a true necrotic process, which is actually causing a well-marked solution of continuity in structure, in 95 cases in 100 it is cancer.

Cancer of the cervix, therefore, as we almost invariably see it at present, is usually easily distinguished by the ordinary clinical examination, but if the educational side of this question is taken vigorously in hand, the border-line cases will be much more frequently seen, and then the microscopic confirmation of suspicious pathological appearances will become more and more important. I can imagine no more dangerous fallacy than to assume that as clinicians we can make the diagnosis without this aid in the early stages of the growth. Before every other consideration these early suggestive signs should be minutely investigated by the usual digital and specular examination, and then, if in doubt, the microscopic investigation should be invoked.

While, as stated, the usual clinical investigation will, as a rule, conclusively settle the question of suspicious symptoms referable to lesions of the cervix, it utterly fails in cancer of the fundus. Many a case has been passed through the operator's hands as endometritis, polypi, etc., which ultimately proved to be cancer. Many other cases have been subjected to hysterectomy for cancer when it was not present. These mistakes will not occur if the microscopic examination is conducted by a skilled observer. When therefore, the clinical evidence is deficient the microscopic examination becomes the court of final resort. As a routine, uterine scrapings from all cases should be submitted for microscopic examination.

Early Diagnosis. That a diagnosis should be made in the majority of cases before the disease extends beyond the operative limit has been shown conclusively by Sampson, for in about 76 per cent. of 162 operable cases at the Johns Hopkins Hospital and about 81 per cent. of 250 inoperable cases there had been a history of bleeding for over three months before the patients came to the hospital, and bleeding had been present for over six months before their admission in about 51 per cent. of the operable cases and in about 60 per cent. of the inoperable cases.

Brunet¹ analyzed the cases of v. Rosthorn, Wertheim, Krönig, and Mackenrodt, examined so painstakingly by Kermauner, Kundrat, Pankow, and himself. In these 251 cases the general average of operability was 67 per cent. Of those operated on, in 50 per cent. only was a truly radical operation possible; i. e., an extensive operation with great probability of success. He analyzed further 168 of the 251 cases in which there was sufficient history to tell how long the cancer symptoms had existed before the disease became advanced or inoperable. He found that in 18 cases which had been exposed to operation within two months

¹ Archiv f. Gynäk., lxxviii, 3, 632.

of the onset of symptoms in 44.4 per cent. the cancer had advanced beyond the confines of the uterus; in 5.5 per cent. the disease was inoperable. After two months of symptoms the disease was inoperable in 20 per cent., after three months in 26 per cent., and after six months in 40 per cent.

Wilson¹ ascertained the length of time during which the symptoms of cervical cancer existed in 49 cases before the patients applied to a doctor for relief. The symptoms had existed: two months or less in 5 cases, of which 4 were operable; two to six months in 16 cases, of which 3 were operable; six to twelve months in 10 cases, of which 3 were operable; one year and upward in 18 cases, of which 3 were operable.

Wilson says that the presence of any irregular or increased loss of blood or of any new discharge calls imperatively not only for an immediate careful pelvic examination, but for an exact diagnosis with the least possible loss of time. In a single woman it is at the utmost allowable to wait for a short time, say a fortnight; in all other cases the examination should take place within two or three days, and if cancer is observed and is still operable, its removal should be carried out within ten days of the patient's first seeking advice.

In the gynecological department of the University of Pennsylvania Hospital, cancer of the cervix has been discovered through the aid of the microscope in but 1 case when it was not suspected. In cancer of the fundus, however, several cases have been diagnosed in this way, and the patients permanently cured by early operations. In the first the clinical evidences are sufficient in possibly 95 cases in 100; in the second the percentage is so greatly diminished as to make the microscope the chief diagnostic aid.

One may say that cancer of the cervix can almost invariably be diagnosed by the usual clinical examination; in cancer of the fundus it can at best be only surmised. If, as we anticipate, these cases come to us earlier for consultation as the result of popular education, more and more valuable will become the services of the expert pathologist.

REPORT OF CANCER COMMITTEE. In order to stimulate the profession at large to greater efforts in the early diagnosis of cancer, the Committee on Cancer of the Uterus has advised² that the following letter should be sent to each member of the County Medical Societies:

DEAR DOCTOR:

The Section on Obstetrics and Diseases of Women of the American Medical Association has appointed a committee to investigate some of the practical facts regarding cancer of the uterus. The committee has done so and I submit herewith a copy of their report.

The subject is of such great importance to the entire community that I trust you will give the report your painstaking consideration.

Very sincerely yours,
Secretary of Section.

¹ British Medical Journal, March 10, 1906, p. 545.

² Journal of the American Medical Association, vol. xlvii, No. 23, p. 1867

*Report of Committee.*1. *Cancer is a frequent disease.*

Apparently 5 per cent. of all deaths after the age of thirty are from cancer somewhere in the body.

2. *At its inception is it capable of complete eradication?*3. *It is rarely cured today.*

It probably kills more than 90 per cent. of those afflicted.

4. *It is evident, therefore, that the methods of the past are wholly inadequate to the needs of the future.*

We believe that popular ignorance of facts, indeed very patent facts, accounts for this deplorable mortality in a curable disease. The time has come for us to revise our views and for the public at large to be taken more closely into our confidence regarding cancer. We would, therefore, ask your earnest coöperation in the fight against this disease.

To the best of our knowledge the following is a brief, but true and accurate recital of facts regarding cancer in general, and cancer of the uterus in particular.

A. *Cancer in General.*1. *Cancer is primarily a local disease.*

2. In its primary stage it is so localized that every particle can be removed; it is, therefore, capable of complete eradication with a resulting permanent cure.

3. While still local it causes, as a rule, little or no discomfort, and no loss of weight. The deviations from normal seem slight, indeed, and yet they are very definite, easily recognizable, and demand immediate investigation. Upon its first recognition, immediate removal by a competent operator is the requisite for a cure.

4. The disease, if not at once eradicated, progresses with great rapidity to other parts of the body by continuous growth and by metastasis.

5. When it has passed beyond the bounds of the original organ, however slight the involvement may be, the prospects of relief grow rapidly less with the days and with the extent of the involvement.

6. Serious symptoms of cancer rarely appear until an inoperable stage of the disease has been reached.

7. The classical description that has so long stood as a picture of cancer (pain, hemorrhage, offensive discharge, emaciation, profound anemia, and an ashen hue) is really a picture of impending death, due to advanced cancer, and irrevocably indicates the impossibility of a cure at this stage.

8. The *time* of operation (measured by the progress of the disease) is much more important than the *type* of operation, for a simple operation, if performed very early, may effect a cure, while the most radical at a later stage is of no avail.

B. *Cancer of the Uterus.*1. *Cancer of the uterus is the most frequent form of primary cancer.*

2. Cancer of the uterine cervix is much more frequent than cancer of the body of the uterus, and is much more malignant because it spreads beyond the limits of the uterus much more quickly. For the above reasons cancer of the uterine cervix will be considered first.

Cancer of the Cervix.

A critical study of the subject leaves little room to doubt that removal by operation, while the disease is still very limited in extent, offers the best and practically the only chance of cure. The main hope, therefore, lies in operating before the disease has passed beyond the limits of the uterus (either by metastasis or by direct extension), because it has been demonstrated over and over again that even microscopic particles of cancer which are not removed continue to grow. It is this continued growth which gives the so-called recurrences in the great majority of cases.

An early diagnosis is possible in a large percentage of cases. Probably over 50 per cent. of the operable cases, and a much higher percentage of the inoperable ones, have been bleeding for six months before any treatment is considered. As

the course of the disease is usually rapid, six months or even less of neglected uterine bleeding permits the disease to extend so far that only a small percentage of the cases can be cured. Even in the face of this statement, it must be still remembered that many apparently advanced cases have been cured permanently by the more recent radical operations.

Because of the frequency of the disease, the narrow limit of time which separates success from failure, and the overwhelming proportion of women (94 to 97 per cent.) who absolutely neglect themselves until it is too late for them to receive benefit, it is apparent that ignorance of facts is a chief factor in the deplorable failures of the past. It is evident that to accomplish better results the disease must be detected earlier, very much earlier, in 95 per cent. of all cases.

For the purpose of improving the possibility of a greater number of cures, we would ask that you instruct your circle of acquaintances regarding these facts. Especially would we suggest that you impress women regarding the wisdom of a careful physical examination at the first appearance of the unaccountable uterine bleeding or discharge, and the necessity, in case of doubt, of employing the services of an expert in pelvic diagnosis. In Prussia, where the education of women along these lines has been attempted on a large scale, results already show a striking increase in the percentage of cases discovered early in the course of the disease.

Permit us to call attention to some of the suggestive symptoms of early cancer of the uterus—symptoms which are not in themselves conclusive, but are always sufficiently suggestive to make a careful and exhaustive physical examination advisable, and in most instances imperative.

Symptomatology of Cancer of the Uterine Cervix.

- (a) A disease of midlife, occurring especially between the ages of thirty and fifty.
- (b) It rarely occurs in women who have not borne children.
- (c) While there is no characteristic early sign of cancer, bleeding or a blood-stained discharge is usually, but not always present. It may be: (1) Slight, "only a show," appearing at irregular intervals, as on exertion, after sexual intercourse, using a douche, or straining at stool; or it may be slight but constant, the patient noticing that her clothes are slightly stained on taking them off at night. (2) In other cases the bleeding may be more profuse, simulating a prolonged or irregular menstruation, or a return of the menses after the menopause. (3) In still other cases severe hemorrhage may occur, appearing either as the result of some unusual exertion or during menstruation, or the cause may not be apparent.
- (d) In a small percentage of the cases bleeding may be absent, but usually some other sign, such as unusual leucorrheal discharge, calls attention to the growth. In a small percentage of cases all symptoms referable to the growth may be absent for a long time.

(e) Pain caused by the growth usually occurs later in the course of the disease and must be differentiated sharply from pain arising from pelvic trouble independent of the cancer, such as inflammatory conditions of the tubes, ovaries, etc.

3. It is evident that all women suffering from uterine bleeding or other symptoms referable to the uterus should be examined as soon as possible, and if the diagnosis is not clear the uterus should be curetted, or a small piece of the cervix excised and not thrown away, but preserved in 10 per cent. formalin or ordinary alcohol and sent to a competent pathologist.

4. All symptomatic aberrations referable to the generative organs of women about the menopause should be looked on as the possible beginning of malignant disease, and an immediate examination should be urged. If no pathological change is detected, this fact alone would be of great value to the physician as well as to the patient. If a suspicious area is found, prompt measures for its certain diagnosis by the microscope may be instituted.

(a) *Course.* Its course is rapid. It passes beyond the limits of the uterus proper (and hence becomes practically incapable of complete eradication) in a period which usually varies between thirty days and six months from the outset of the earliest

symptom. When it runs its course undisturbed patients rarely live more than three years. About three-fourths of them die within one year after the first manifestation of the disease.

(b) *Results under Existing and Past Conditions.* Probably from 75 to 80 per cent. of these patients in this country do not apply for treatment until the disease has progressed too far for anything but palliative measures (*i. e.*, until the disease is no longer limited to the uterus). In only about 20 to 25 per cent. of the total number of cases of cancer of the cervix is radical operation attempted. In the vast majority of these cases a careful study of the gross specimen and microscopic sections from the outer margin will show that the surgeon has failed to remove all of the diseased tissues. The so-called rapid recurrences are really, therefore, continued growths. In these cases medical attendants have made an effort to save the patient's life, but the disease had, unfortunately, progressed too far for that result to be possible. Unfortunately in from only 3 to 6 per cent. of the total number of cases of cancer of the cervix is an operation instituted early enough for the surgeon to circumvent the disease. It is only in this class, of course, that the disease is completely eradicated.

(c) *Results which Appear Easily Possible.* Authentic cases of complete eradication of undoubted cancer of the cervix are so numerous as to leave no doubt that, if the diseased tissues are completely excised and if the implantation at the time of the operation is avoided, a permanent cure is not only possible, but also probable.

Cancer of the Body of the Uterus.

Cancer of the body of the uterus is much less frequent than cancer of the cervix, grows much more slowly, and remains restricted to the uterus for a long time; and for these reasons the diagnosis is usually made earlier in the course of the disease and its operative treatment is attended with a lower primary mortality and a much higher percentage of cures. Cancer of the body of the uterus usually occurs at a more advanced age than cancer of the cervix, and is more frequent in women who have not had children.

De Seigneux¹ has invented a chart on which he instructs his patients to indicate the date of each menstrual period, the duration of each one, the quantity of blood lost, and the amount of pain. There is also an arrangement for indicating bleeding between the periods and the occurrence of leucorrhea. He thinks women should present such charts to the specialist or to the family physician every six months before and every three months after the thirty-fifth or fortieth year.

The advisability of sounding a general alarm among the laity with regard to cancer is slightly questioned by the terror which some nervous individuals would experience in case they had symptoms which suggested it. Romer² reports a case of mental derangement from this reason in a previously healthy woman. Such an occurrence would be exceptional, for ordinarily, even if a woman were alarmed over her symptoms, the assurance of a physician in whom she placed confidence would effectually control her feelings.

Some experiments of Margliano³ indicate the possibility of diagnosing cancer, of the stomach at least, by means of precipitins. He injected gastric juice obtained from individuals suffering with cancer into animals. From these animals he obtained a serum which, when added to the gastric

¹ Centralbl. f. Gynäk., xxx, 9, 270.

² Zeitschr. f. Krebsforsch., Band iv, Heft 1, S. 75.

³ Riforma medica (Naples), xxii, No. 33, p. 897.

juice of cancer patients, caused a precipitation, while, when added to normal gastric juice, no precipitation occurred.

Prophylaxis. Keetley,¹ believing that cancer is infectious, recommends certain prophylactic measures. These include:

(1) Sterilization of food. (2) The sufficient and regular toilet and protection of the nipples and of the genitalia. It is significant that these parts are each the outwork of a region which is frequently attacked by cancer, and especially often polluted by stale secretions and discharges. These parts, moreover, are more frequently handled by their owners than is any other part of the person usually covered by clothing. (3) Due care of the mouth and teeth. (4) The destruction of dressings from discharging malignant ulcerations and the avoidance of pollution of the fingers by these discharges. (5) Careful and persistent attention to non-malignant sores or tumors. Chronic ulcers should be healed as soon as possible. Instances of old ulcers and scars becoming malignant are innumerable. (6) Early excision of ulcers and tumors in which there is any possibility of malignancy. (7) Abstinence from alcohol, tobacco, and foods which have waste products which the kidneys, the bowel, and the skin cannot easily and thoroughly get rid of, and which thereby provoke and sustain the chronic inflammations and ulcers which so often prepare the way for cancer. (8) Physical familiarity should be avoided except with those who are nearest and dearest to us. (9) Special attention to the cooking and serving of food—by keeping utensils clean and servants aseptic and healthy.

Result of Operative Treatment of Cancer of the Uterus. Interest relative to the result of the operative treatment of carcinoma centres chiefly in cancer of the cervix. The percentage of permanent cures in cancer of the body is very high.

Last year I gave in detail the excellent report of Wertheim on cancer of the cervix. In his first series of cancer operations, more than five years old at the time of this report, he had 11 per cent. of absolute cures. This percentage was calculated according to the method of Waldstein, and Werner, and the 11 per cent. represents that 11 women out of every 100 who went to Wertheim's hospital suffering with cervical carcinoma were permanently cured. A sufficient number of years has not yet elapsed to estimate the percentage of cures, except in the hands of the men who first undertook the radical operation for cancer. It is so difficult to trace cases after operation in this country that as complete a report as that given by Wertheim can scarcely be made here. Mackenrodt's statistics also were reported last year. This operator, although the first of his series of cases were but four years old, did not speak definitely concerning his percentage of operability, and therefore an exact calculation after Waldstein or Werner's plan could not be made.

¹ *Lancet*, October 13, 1906.

There is this great fault in most of the reports, and unless they are uniform and complete they are practically useless for the sake of comparison and for the purpose of determining a general average of cures.

In estimating cancer statistics the absolute percentage of cure can be readily found by comparing the number of cases free of a recurrence after five years with the number of patients originally coming to the hospital with carcinoma. Of course cervical cases and corporeal cases should be kept distinctly separate. The ratio which the total number of cures bears to the total number of cancer patients during the period in which the patients were operated on is the absolute cure percentage. This simple method gives the same result as the more complicated one of Waldstein. In order to make complete every phase of the report, an author publishing the statistics of his cancer cases should include: the total number of cases (specified as cervix or body) applying for treatment during a certain period; the number selected from these on which a radical operation was performed; the number dying from the immediate effects of the operation; the number well and free of recurrence after five years. I am borrowing now the idea of Werner, as published in last year's *PROGRESSIVE MEDICINE*.

In the reports made during the past year the statistics as given are confusing and one cannot arrive at a correct conclusion. Either the total number of cases applying for treatment are omitted, or there is no apparent distinction between cervical and corporeal cases. In some there is no separation in the operative cases between a vaginal and an abdominal procedure.

The clearest paper of the past year is that of Hannes,¹ who reports the cases of cervical carcinoma operated on at Küstner's clinic from April 1, 1895, to March 31, 1901. All the statistics apply to cases over five years old. There were altogether 361 cases; of these 145 were subjected to operation; 99 were vaginal extirpations and 46 were abdominal operations. There was a primary mortality to the vaginal operations of 8 per cent. and to the abdominal of about 32.6 per cent; 24 of the vaginal cases are living and well at the end of five years. From this he says the absolute percentage of cure in his vaginal cases *à la* Waldstein is 28.8 per cent. This is a gross error, and unless he performed the vaginal operation exclusively for a certain period, and knows the total number of cancer cases coming to the hospital during that time, he cannot compute his absolute percentage of cures except by combining his vaginal and his abdominal operations. He says the permanent cure in the abdominal cases, according to Waldstein's method, is 14.3 per cent. This too is evidently an error, but the figures are so confusing one cannot correct it.

Also Doderlein² says he agrees with Wertheim, Glockner, and Kroemer

¹ Zeitschr. f. Geburtsh. u. Gynäk., lvii, 2.

² Beitr. z. Geburtsh. u. Gynäk (Hegar's, Leipzig), ix, 2, 173.

in accrediting Waldstein's method of reckoning as being the correct one.

Then he says that according to this method he had 12.5 per cent. of permanent cures by the vaginal operation between October 1, 1897, and January, 1900. 134 cases of cervical cancer applied; 59 (44 per cent.) were operable; the primary mortality was 16.4 per cent. As far as we can see this would give Doderlein's absolute cure at 10.4 per cent. In another paper¹ he says his percentage of total cures after vaginal extirpation is 9 per cent. Thus it goes.

Blau² gives the statistics concerning cancer operations at Chrobak's clinic. They used the vaginal operation at first altogether; now they select the cases as suitable for either the vaginal or the abdominal operation. There are so many divisions and ramifications of the figures that they are worthless for comparison. Cancer of the body and of the cervix are included in the total numbers. Some operations were vaginal and some were abdominal.

Schindler³ gives in great detail the clinical and anatomical results of 117 cases of abdominal hysterectomy for cancer at Knauer's clinic in Gratz. With but one exception these were all cervical cancers. The mortality of the entire series was 13.67 per cent.; the operability varies between 22.85 and 36.1 per cent. The total number of cases in the clinic and polyclinic were 588. The author reckons his absolute cure percentage from the total number of patients, 588, and the total number living after five years. The absolute cure percentage is averaged at 3.18 per cent. There are many other combinations of figures, but it is hard to draw any further conclusions from his paper.

Ries gives the report of 8 cases, all of which occurred over five years ago; 2 of the patients died practically on the table. All had carcinoma demonstrated by the microscope; 4 of the patients are living today and free of all cancerous change; 1 patient was free of recurrence for nine years and then had a cancerous degeneration of the inguinal glands; 1 patient later developed a carcinoma of the breast. It differed in type from the carcinoma of the uterus. Ries regards it merely as a coincidence. Microscopic examination of the glands removed in these operations showed carcinoma present in 6 patients, 4 of whom are alive today. The only point lacking in Ries' statistics is his percentage of operability. If one knew how many cases the author had seen during the time his operative cases were selected, then his statistics would be valuable for comparison. As it stands they are not.

COMPARISON OF METHODS.—The abdominal operation has been very generally adopted. This is for several reasons: in the first place, the ureters can be better protected from harm; instead of never seeing

¹ Deutsche med. Wochenschr., Band xxxii, Nr. 38, S. 1533.

² Beitr. z. Geburtsh. u. Gynäk., x, 3, 375.

³ Monat. f. Geburtsh. u. Gynäk., xxiii, 1, 78; 2, 235; 3, 371; 4, 502.

them during the entire course of the operation and constantly keeping out of their neighborhood, as is common in vaginal methods, in the modern abdominal operation they are exposed early and kept constantly in view. Furthermore, there is no question but that the parametrium can be removed to a greater extent than in the vaginal operation, unless Schuchardt's incision is used, and this more or less complicates the procedure. Again, the abdominal method permits a much greater degree of exactness and nicety in the ligation of vessels, in the closure of the peritoneum over the operative field, and in the institution of drainage. The excision of the upper part of the vagina is quite as easy by the abdominal as by the vaginal route. When we leave these reasons and consider the question of glandular extirpation, there is nothing but the abdominal operation to consider.

v. Rosthorn¹ notes that recent microscopic examinations of the parametria (Kermauner, Kundrat, Kroemer, Pankow, Brunet) have shown that the very small lymphatic nodules, specially described by Lucas Championnière, five or ten in number, actually exist. As a possible starting point for recurrence they are of special interest. If they are swollen they may even be observed during the course of the operation. Undoubtedly the most important clinical question is in relation to the frequency with which the glands are affected in the progress of cancer. At present the frequency, as indicated by many thousands of serial sections, varies from 20 to 42 per cent. It would seem, therefore, that in at least one-fourth of the cases which have been operated on, involvement of the glands has been demonstrated (Baisch, Brunet). Practically considered there is another important question, that is, whether the glands are also affected when the parametria are free from cancer. This happens, according to Baisch, in one-fifth to one-tenth of the cases. It also appears to be true that cancer may appear in the glands in its earliest stages. Clinically it is impossible to say whether the parametria are altered or not, and the same is true of the pelvic glands. Enlarged glands or indurated parametria are frequently found free of cancer, whereas unenlarged glands and clinically soft parametria are sometimes cancerous.

Opitz² found the parametrium diseased in more than 50 per cent. of the operable cases, and the glands in 33 per cent. Pankow³ found in 67 cervix carcinomas and in 3 carcinomas of the fundus that the glands were affected in 38.2 per cent.

Now that it has been quite generally settled that the abdominal operation is the one of choice, the question arises, even more insistently than before: Should removal of the glandular system be a part of the procedure? The plan of Wertheim, viz., to remove only the glands which are enlarged, has been proved to be inconsistent by the careful work which has been

¹ Journal of the American Medical Association, vol. xlvii, No. 23, p. 1872.

² Monatschr. f. Geburtsh. u. Gynäk., xxiii, 1.

³ Archiv f. Gynäk., lxxvi, 2.

done in the examination of the pelvic lymphatics by microscopic section. It has been conclusively shown that glands which are enlarged are not always the seat of metastases, and, contrarywise, that even unenlarged glands may be cancerous. Accordingly, if there is any attempt at all for glandular extirpation it must be complete if any good is to result.

No modern surgeon, says von Rosthorn¹, would content himself by attempting to extirpate cancer of the breast by merely removing the part apparently affected. We are now convinced that such a proceeding is totally inadequate. It is necessary to remove not only the whole breast and the underlying fascia and muscle, but also the axillary glands, whether they are enlarged or affected in any way or not. The improvement in the mortality results may be ascribed partly to an improved operative technique, due to increased experience, as well as to the fact that the operators modified their procedure and made it less radical. This reduction was most striking with Wertheim, who gave up his original radical method after finding that when the lymphatic glands were affected recurrence almost invariably took place. His example seems to have been followed by the majority of German operators, with the exception of Mackenrodt. v. Rosthorn's own experience has been the reverse of Wertheim's. Venturing more and more on complicated cases, and striving to do the utmost in operating very radically, he has found his mortality increasing. Whether the brilliant results obtained by the abdominal method justify its greater primary danger compared with the vaginal method has not yet been settled. At present there are only two reports in our literature covering a period of more than five years (Wertheim's and Schindler's): the latter comprises also a part of v. Rosthorn's material. These reports differ greatly, the first being very favorable and showing successes superior to any heretofore obtained by the vaginal method, and the latter being unfavorable. In the face of such diverse observations further reports must be awaited. v. Rosthorn's idea is to adhere as closely to a radical procedure as possible, until the question of the glands is definitely settled. Besides these glands an extensive part of the upper vagina and the connective tissue of the pelvis must be removed, especially in those more dangerous areas which correspond to the zone of thickening and in which are located the vessels leading to and from the uterus. Even the sacrouterine ligament should be removed as closely as possible. v. Rosthorn excises as much gland tissue as he can reach, irrespective of whether it appears involved or not. He excises the glands lying at the point where the iliac vessels divide, as well as those located on the outer side of these vessels, and also those lying in front of the sacrum, because he is not thoroughly convinced that these measures are of no value, in spite of a

¹ Journal of the American Medical Association, vol. xlvii, No. 23, p. 1872.

failure to get results in his first cases. The extirpation of the iliac glands is difficult and dangerous when there are numerous adhesions to the outer coat of the large vessels. Injury, however, to the iliac vein is not necessarily fatal. In the case of injury if the lateral ligature is not successful the vessel should be ligated completely. He has never seen any dangerous sequel arise from ligating the internal iliac.

Ries¹ is even more insistent than v. Rosthorn. Rational operative treatment of any cancer, he says, is the outcome of our conception of the pathology of cancer. True cancer in its beginning is a limited local disease and can be cured if the entire area involved is removed. Clinical experience agrees with this theory and proves that undoubted cancers have been cured for good in a number of cases after removal of the diseased area. While data containing this fact are indisputable, if not very numerous, it must be emphasized that no other known method of treatment has so far satisfied the double test which is required in a critical investigation of operative results. This double test consists, first, in confirmation of the diagnosis by the microscope, and, second, by the observation of the patient for many years (at least five) after the operation.

Reports which do not specify these two tests are of no scientific value. The objections to the removal of the lymphatic glands have been numerous and severe. It has been stated that cancer in the glands may undergo spontaneous cure, and as evidence of this the microscopic appearance of degeneration of cancer glands has been described. The author affirms, however, that the processes of degeneration are common and occur everywhere in cancer, though associated with the most aggressive growth. It has been objected also that it is never possible to remove all of the lymphatics, and that such an undertaking is chimerical. But the same holds true to carcinoma of the breast, and yet no one has claimed that because mediastinal glands cannot be removed there is no use to remove those above and below the clavicle. Is it not correct, asks Ries, to remove at least all that you can? He thinks that the question of the removal of the lymphatics has been treated very unscientifically here and there. Some surgeons remove only a few which seem enlarged or happen to come out easily. They have these examined and may be find no carcinoma. Therefore, they conclude that it is not necessary to remove glands at all, because the few which they removed did not show cancer. This is reasoning from insufficient data, and, as a matter of fact, the more thoroughly the operator removes the glands the more frequently does the pathologist find cancer in some of them. The most severe objection which has been raised against the advanced radical method is that the mortality is frightful. One operator who followed the radical method closely in his first 30 cases had a high mortality,

¹ Journal of the American Medical Association, vol. xlvii, No. 23, p. 1869

and has, therefore, changed his method so that now it is little else but an abdominal operation after Freund, with the addition of the dissection of the ureters. A few glands are removed or none at all. His primary mortality has become a matter of pride in his second and third series of 30 cases. A considerable number of operators follow in his footsteps and are devotees of a conservative radicalism, which inevitably leads back to a high percentage of recurrence, and throws a remarkable light on the statement of one of those operators, that all his cases in which cancer has been found in the glands have become recurrent.

I must insist, says Ries, that the removal of lymphatic glands is only a part, even though an important part, of the operative treatment of cancer of the cervix. The removal of the uterus is really incidental to the removal of a large mass of pelvic connective tissue which surrounds the uterus. The operation is carried out like the radical removal of a cancerous breast. This method blocks out an area which with greater or less probability includes the outposts of the cancer as well as the original growth. A clean anatomical dissection, with ligation of the vessels themselves, without formation of stumps, is the characteristic feature of the technique of this operation.

Therefore every cancer which is not removed completely kills its bearer sooner or later. The more we follow up cancer along its irregular and incalculable course, the greater the chance of removing it all. An incomplete operation does not save from death in cancer. It is worth while to risk a severe operation where the alternative is a lingering, often horribly painful and disgusting disease, the best side of which is the semi-idiocy of the morphine-numbered bearer of the cancer.

Even with the most perfect basis for a theory, no one can accurately predict its truth until it is established by practical experience as a working law. All operations in their incipency are controlled by this general statement; for any given procedure, no matter how theoretically plausible it may appear, may prove to have decided limitations when fully tested. I am sure all of us who have participated in the invention of the more radical operations for cancer of the uterus have, at least mentally, if not verbally, overshot the mark in our forecasts of their value. No one has been more enthusiastic than myself in the hope that the wide excision of locally involved tissues and the extensive dissection of accessible glandular areas in cancer of the uterus might lead to far better results. With ten years' experience, however, my enthusiasm has been greatly moderated by the results of the radical operation.

It has not been the immediate mortality—for this has been minimum—but the high ultimate mortality which has given rise to a feeling of skepticism as to the value of the extirpation of the iliac glands. Convinced by my experience that the removal of the glands cuts little figure in saving our patients, but that the wide excision of the locally involved tissues is the vital factor, I have abandoned the first and concentrated

my energies upon the second. The operation, therefore, as practised by me is limited to the widest possible extirpation of the upper portion of the vagina and the adjacent parametrium. If it is necessary to dissect the ureter out of a bed of carcinomatous tissue or to excise the lower portion of the ureter, I at once abandon the operation, rather than resort to such a difficult and dangerous operation for the very remote hope of saving the patient.

Statistics so far as operation for cancer are concerned are, at best, confusing if not actually misleading. Each surgeon is a law unto himself, for no two operate alike, judge cases alike, or follow up the after histories with equal precision. The old attributes of a skilful surgeon are dexterity, celerity, precision, and good judgment. In many simple operations a surgeon may have almost none of these attributes, and yet be successful. In operations for cancer, however, the absence of any one of these may make a very serious discrepancy in the results of various operators. In cancer the judgment as to the possible efficacy of any operation is perhaps the most vital of all. In the statistics of some writers one finds a very high rate of recurrence; in another, a very low one. This many times is not due so much to a difference in the actual skill as to the fact that one operates upon almost all cases which come to him, whereas another chooses his cases with the most discriminating care.

When the radical operation was first proposed, many surgeons assumed that it held out a greater hope for far-advanced cases of cancer, whereas exactly the opposite was the truth, for in these cases the radical operation carries with it a very much larger immediate mortality and is of no greater value than a simpler procedure in alleviating symptoms. With varying forecasts we have all left the ultimate decision as to the value of radical operations to the test of time, and now it has been sufficiently employed by many competent surgeons to furnish an approximate idea as to its efficiency in each individual's hands. Therefore, from the experience of a few men we can draw more accurate conclusions than from a general collective statistical study, with all of its misleading elements of variations.

As just stated, with the results of my own experience, which I believe are sustained by other present-day statistics, I do not believe we are justified in prolonging a hysterectomy for cancer by an extensive dissection of the pelvic lymph glands. Briefly stated, this conclusion is based upon:

1. The absence, as yet, of any known law concerning metastasis; for, as already demonstrated, the glands of the side of greatest local involvement may be free, while the parametrium, or higher glands of the opposite side, may show microscopic foci.

2. The unreliability of the microscopic appearance of a gland in determining metastasis; for a large, palpable gland may be removed

painstakingly from the bifurcation of the iliacs, and prove to be of an inflammatory character only; while an invisible lymph radicle or a microscopic gland immediately adjacent may be the lodgement place for cancer cells.

3. The absence of any law as to what type of case gives metastasis. A very limited local process may show wide glandular metastasis, whereas the opposite may be true in the extensive local involvement.¹

4. The peculiar distribution of metastasis, in that occasionally a lower group of glands may escape metastasis, whereas those above are involved.

With all these facts before me, I can no longer conscientiously prolong an operation in the search for pelvic lymph glands with the certainty of a higher immediate mortality occasioned by it, without a reasonable hope for a decided improvement in ultimate mortality. Unless there is a very appreciable improvement in ultimate mortality, the greater immediate mortality from these extensive operations will more than counter-balance any good that they may accomplish in an occasional case. Notwithstanding my skepticism, however, I am still quite willing, and even sanction the most extensive operation in the hands of any skilled surgeon who is still guided by the hope that he may accomplish better results in this way than those that have hitherto been obtained by other methods.

Therefore I watch with the greatest interest every report of such men as Ries, Wertheim, v. Rosthorn, Krönig, Mackenrodt, and others who still hope for the benefits to be derived from glandular extirpations.

As a pioneer in the advocacy of a radical operation, the natural question arises at once as to whether I have dropped back to the opposite extreme. I may at once answer this negatively, for to this retrogression I am strongly opposed. Upon the wide destruction of the locally involved tissues depends the greatest percentage of surgical cures. In my opinion a vaginal hysterectomy will not accomplish this as satisfactorily as a high amputation of the cervix and extensive cauterization of the surrounding vaginal wall. Neither procedure, however, ensures this local eradication as satisfactorily as the operation now employed by Professor Wertheim. His modification of certain details of the operation originally suggested by Ries, Rumpf, and myself greatly facilitates its rapidity and thoroughness. The clamps which he has invented for closing off the vagina from above are splendid devices, and make a decided improvement over the imbricated method of ligating the vagina, which I formerly employed. I have repeatedly used the instruments and find that they not only render

¹ It has been our hope that these glandular studies, in connection with the microscopic investigation of the type of the local process, might give us some clue as to the cases in which we may expect these peculiar variations. Pfannenstiel believes that he has discovered certain evidences which may be of value in such a prediction. As yet, however, they have not been incorporated in a working law.

the operation much easier, but also greatly reduce the time of operation and render it much more aseptic.

Therefore, in conclusion, I believe the operation, as practised by Wertheim, with the exception of the wide dissection of the lymph glands, is the one most to be advised in skilled hands; but for a novice or a surgeon with limited experience in abdominal surgery, even this is too difficult. In every case where the glands are easily accessible, and no extra time is necessary for their removal, I extirpate one or two for pathological examination. If they are the seat of metastasis, I look upon the prognosis as hopeless. As already demonstrated beyond question, the cure of cancer in all but a small percentage of cases will not be accomplished by any surgical operation; but at present it is the only means which holds out any hope, and in every feasible case should be resorted to before any other means of treatment. The future, however, must evolve some other therapeutic means than surgical.

IMPROVEMENT IN THE RESULTS OF THE RADICAL OPERATION. It is the consensus of opinion that an earlier recognition of cancer and an early operation will be a most important factor in any improvement in the treatment of this disease. In order to effect such a consummation, physicians in general must realize the insidiousness of cancer.

Veit¹ speaks of the necessity of holding the confidence of the public in order to persuade women to consult a physician early because of symptoms which may be due to cancer. An improvement in the primary mortality of cancer operations, he says, will go a great way toward this end. The special danger in the very early operation for carcinoma is found in the streptococcus, which he thinks often infests the new growth. Later in the course of the disease antibodies are formed in the blood which counteracts the toxin of this organism, but in advanced cases the heart is nearly always bad and the operation needs to be more radical. Veit directs especial attention to three things in an effort to improve the primary mortality:

1. The preliminary disinfection of the cancerous area and the administration of *antistreptococcus serum*.
2. The use of spinal anesthesia instead of chloroform.
3. The avoidance of much manipulation of the pelvic veins, in order to avoid thrombosis and embolism.

He adopts Mackenrodt's method of preliminary disinfection, viz., curettage of the cancer twelve hours before operation and tamponade with 4 per cent. formalin solution. Directly before operating the vagina is flushed with alcohol and sublimate solution. Several hours before the operation 10 to 20 c.c. of antistreptococcus serum are used. He so plans his technique that the incision into the vagina is the last step of the operation; even the glands are removed before the vagina is opened.

¹ Berlin. klin. Woch., xliii, 8, 213.

After the uterus and adnexa and glands have been removed, and after carefully uniting the upper margins of the vaginal incision, he mops the line of suture and the neighboring peritoneum and wound with alcohol. This is quickly dried up again with sponges. He ties both internal iliacs or both uterines at their origin, together of course with the ovarian and round-ligament arteries, and finds that he does not need to bother with the corresponding veins. As all the blood to the operative area is cut off, there is no venous return. He speaks of adopting Bumm's technique in ligating the internal spermatic artery (uterine), viz., the early exposure of the vascular triangle. (See *PROGRESSIVE MEDICINE*, 1906.)

Veit uses spinal analgesia with stovain according to the method of Bier and Sonnenberg. In only 5 cases out of 18 was chloroform necessary to complete the operation. In 2 of these cases the dose had been very small—0.04 gm. He uses stovain at the present time and always gives 0.08 gm. Experience in this method teaches one the manipulations which are painful and the parts which are sensitive, and with a little care these can be largely avoided. He thinks it is of the greatest importance to have the room absolutely quiet during the disinfection of the operative field and the injection of the stovain.

This idea of using antistreptococcus serum is not a new one, and I mentioned the use of it by Bumm in last year's review. With the same object in view Hannes¹ has used nuclein in an effort to provoke hyperleukocytosis and thus raise the resisting powers of the individual. He injected 51 cases which were exposed to abdominal hysterectomy by Küstner for cancer of the cervix. 50 c.c. of a 2 per cent. solution of nucleic acid were used in the form of sodium nucleate. The injection was made ten to sixteen hours before the operation.

The reaction was striking; there was an increase in temperature and in 3 cases a chill. In nearly every case there was marked hyperleukocytosis. The author was pleased with the results despite the fact that 11 of the cases, 21.5 per cent., died. He proposes in the future to use Polano's antistreptococcus serum combined with the nuclein.

A distinctly new idea in connection with protective injections has been advanced by Ribbert.² He proposes an injection not to protect against postoperative toxemia, but to immunize the patient against a recurrence of the cancer. He says that an organism in which cancer is developing finally ceases to resist it by the formation of antitoxins, and that at this time the metastases of the original growth occur. It is only by the sudden injection into the organism of large amounts of the toxins of the cancer that a production of protective quantities of the antitoxin can be occasioned. He supports this view by quoting the

¹ *Centralbl. f. Gynäk.*, xxx, Nr. 24, S. 681.

² *Deut. med. Woch.*, Band xxxii, Nr. 42, S. 1693.

experiments of Sticker, who found that a mouse in which an inoculated tumor was growing was immune to further inoculation; but that in case the inoculated tumor was removed this immunity was lost. He argues from this that in such a case the immunity lasts as long as the organism contains the metastatic products of the growing cancer, but as soon as these have disappeared, after removal of the growth, the animal is again subject to inoculation. He believes, therefore, that it might be advantageous to inject an individual after a radical operation for cancer with the products of the very cancer which has been removed. In this way such a production of antitoxin would ensue as to lessen the probability of the further growth of any cancer cells which may have escaped extirpation.

v. Rosthorn¹ believes that an effort must be directed toward lessening the danger of the causes of operation by resorting to it somewhat more exclusively, *i. e.*, only in those cases in which from the very beginning there is promise of a favorable result. This is a wiser course than that of continually attempting to extend the bounds within which an operation is possible; for surgery will always be of no avail when the disease has extended beyond certain limits. The ways in which the mortality may be lessened include a diminution of the time consumed in operation and elimination of possible sources of infection.

In order to avoid complications involving the visceral organs, the whole organism should be systematically and carefully prepared for as long a time as possible before the operation. The general condition should be improved, the heart strengthened, and the blood, if possible, restored to the normal. A carefully selected diet, heart stimulants, and the administration of large quantities of liquids will be conducive to this end. The patient should not be weakened before the operation by intense purging. All parts of the operation pertaining to the preparation of the operative field, preliminary curetting, etc., should be done under scopolamine and morphine, so that as little time under ether as possible is required. The danger of infection should be eliminated as far as possible while preparing the field of operation. The loss of blood should be minimized by using systematic preliminary ligation of the vessels. Injury of the bladder should be avoided by careful dissection, and the enlarged veins of the bladder should be especially protected.

The ureter should be allowed to remain attached to the posterior layer of the broad ligament in order to not interfere with its blood supply. When, however, the ureter passes through cancerous tissue it should be resected entirely and implanted into the bladder.

Prognosis. Last year I noted the belief of Pfannenstiel and Kroemer, that careful observations on the finer histology of uterine cancers and their subsequent clinical course might enable one to judge of the probable

¹ Loc. cit.

rate of growth and malignancy of the individual case by an examination under the microscope. v. Rosthorn¹ during the past year has voiced what is virtually the same sentiment. He says that cases of cancer must be examined very carefully as regards their morphological characteristics in relation to their clinical significance. By this it is meant that the histological structure of the new-growth and its point of origin should be compared with its rapidity of growth, extension, and malignancy. v. Rosthorn has made a study of 22 cases of carcinoma of the cervix with such an end in view. This study has shown so far how great a variation there is in the form and in the manner of extension. It shows, furthermore, how hard it may be to decide even by the microscope the exact point of origin, and this too in incipient cases. Thus he was able in only 3 out of 22 cases to say whether the carcinoma originated from the vaginal portion of the cervix or from the cervical canal.

All investigations which have thus far been undertaken to distinguish the clinical value of uterine carcinoma by its histological structure have led to no result, but such investigations should not be abandoned, for they have only started. There are certain factors which determine the malignancy, viz., energy of the growth of the cells themselves, the structure and the resistance of the matrix and the adjacent tissues, the abundance of preformed tissue spaces, the extent of the lymph spaces, the activity of the lymph stream, etc. Spongy and succulent tissue and vascularity favor extension. The rapid progress in the case of young and pregnant women is sufficiently well known. All slowly growing scirrhus forms appear relatively favorable. Again, others are like the most malignant sarcomas and the speediest operation is followed by recurrence.

Poirier² believes that cancer is always local for a time, depending on the form of the growth and upon the individual. He says 20 to 40 per cent. of the cases operated on are cured according to the latest statistics presented at the recent International Cancer Congress in Heidelberg.

Treatment of Advanced or Inoperable Cases. In the management of hopeless cases Chrobak³ thinks it highly important to keep a patient from knowing that she suffers from cancer. This gives hope until the end comes and is a blessing to her. He recommends thorough curettage and cauterization in all inoperable cases, except those which extensively involve the bladder or the rectum. Although general anesthesia is required he does not speak of the procedure as "an operation" to the patient. The true nature of the affection and of the operation are, of course, made known to the family.

In curettement he uses a large sharp spoon and curettes rapidly until

¹ Loc. cit.

² Journal of the American Medical Association, vol. xlvii, No. 24, p. 2041; Bulletin de l'Académie de médecine, lxx, 36.

³ Wien klin. Woch., xviii, 37.

sound tissue is reached, when the bleeding becomes less serious. Then he uses a smaller curette and follows up all the smaller nooks and crannies of the cancerous extension. The parts are supported meanwhile with a finger in the rectum. After thoroughly drying the parts they are cauterized by means of crude fuming nitric acid. This must be used with great care, the surrounding parts must be protected, and the fumes of the acid must be blown away from time to time. Nitric acid, he believes, is superior to the actual cautery. Care must be taken not to invade the bladder, the rectum, or the peritoneal cavity. After curettage a slough is thrown off in from two to three weeks, leaving a granulating surface which should be treated with silver nitrate or iodine.

Better than douches are insufflations of equal parts of iodoform and tannic acid, or of iodoform and charcoal. The author has performed 408 operations of this sort and reports prolongation of life from three to eleven years. He reports a case of vaginal cervix cancer so treated in 1884 which is still living, and another in 1888 which has had no recurrence to date. He cures and cauterizes repeatedly, if necessary, in the same patient.

Based on his own experience v. Rosthorn¹ says: "I urgently advise operation in cases of recurrence which have not advanced too far for such a procedure." On this account alone it is important to reexamine carcinoma cases at frequent intervals, every eight weeks after the primary operation.

METHYLENE-BLUE TREATMENT OF CANCER. A rather startling announcement has been made by Jacobi² during the past year with reference to the use of methylene blue in the treatment of inoperable cancer. Coming from such an astute observer and renowned clinician the value set upon the drug by Jacobi cannot fail to command attention. He says that methylene blue was introduced into practice in malignant tumors by Moorhof Mosetig, of Vienna. The first man to use it in America was Willy Meyer. At that time it was used a good deal by the injection method. This was very painful and for this reason it was impossible to get the patients to consent to the treatment for any length of time. A large proportion of cancers are seen in the advanced stage, and in the majority of cases of advanced cancer operation is out of the question. Such cases Jacobi has invariably treated with methylene blue, and he can say he has had a number of cases in which the use of methylene blue has been followed by great improvement. He does not say he has ever cured a case. He has seen patients die during the treatment, but he has also seen them comparatively well, attending to business, living three, four, seven, and eight years and perhaps finally succumbing to the disease.

¹ Loc. cit.

² Journal of the American Medical Association, vol. xlvii, No. 19, p. 1545.

Jacobi's attention has been called recently to a large number of bodies favorably influenced by light and which have fluorescent properties. Methylene blue belongs to this class. He has begun to expose his methylene-blue patients to the sunlight. Whether it will be of any use he is not prepared to say. Patients of Jacobi have been exposed in solaria for hours and hours, as long as their household cares or business would permit. It is not impossible but even probable that methylene blue will do a great deal more in connection with light than without it. The drug should be given in pill form, in the small dose of 2 grains a day, and increased to 3, 4, and 6 grains a day. It should be made up in pill form with the extract of belladonna ($\frac{1}{4}$ grain daily). Belladonna will relieve the dysuria much better than nutmeg, which has been recommended for that purpose. Methylene blue may be combined also with arsenious acid. When occasion requires, strychnine or nux vomica should be added. The patient should be informed that the urine will be blue from the very beginning, that it will stain the linen, and that the stains cannot be removed. Jacobi advises patients to have an old handkerchief in readiness and to wipe off the last trace of urine. Apart from this disadvantage patients do not suffer any inconvenience. In his own experience not 1 in 20 complains of dysuria.

Jacobi has recommended methylene blue in a number of operative cases so as to prevent recurrence. He would recommend that every case of cancer of the uterus which has been operated on should be treated in this way to prevent relapses. He has not spoken of the use of methylene blue in the treatment of cancer until the present time because he wanted to be perfectly sure about his results, but he thinks that after fourteen or fifteen years he is entitled to speak of a thing which appears to be of great value. It has done a great deal of good in his practice; he has certainly restored a great many people to their work, and he has kept many people alive two, three, six, and even eight years longer than would have been their share.

X-RAY TREATMENT OF CANCER. Another source of possible relief in malignant disease is the *x*-ray. Skinner¹ says that a large proportion of recurrent malignant growths does not respond kindly to Röntgenization, perhaps because of the increased malignancy with which operative treatment seems to imbue some cancers, notably sarcoma. If Röntgenization is delayed until recurrence is manifest, the process may then have become so widely disseminated as to preclude the possibility of benefit from radiation. If the affected area is radiated immediately after radical extirpation of the lesion, the degree of remedial (destructive) influence demanded of the ray will be limited to such as will be necessary for the elimination of microscopic foci of malignancy, whereas if recurrence is awaited the remedial influence required will be much greater

¹ *Journal of the American Medical Association*, vol. xlvii, No. 19, p. 1541.

because the lesions will be much larger and better developed, and the degree of increase demanded may be so great, especially when deep-seated structures are involved, as to be impossible of attainment. Under such circumstances we would be confronted with a condition which might have been eradicated promptly, but which our omission had allowed to become incurable. It is known, he affirms, that in a certain proportion of cases treated by a cutting operation alone, recurrence will not take place and the cure will be radical. On the other hand, he says no one patient can ever be assured that recurrence will not take place, and it is perfectly certain that recurrence will declare itself in a large proportion of all cases. If immediate postoperative Röntgenization is omitted in any one case, that may be the very one in which recurrence occurs, and it is highly probable that if the ray had been used directly after the operation the accident would have been prevented. By Röntgenizing every operative case one is conscious of having exerted every effort possible to effect a cure. It is imperatively incumbent upon us, he says, to apply every measure which has the power to destroy or inhibit malignancy to the task of lessening the proportion of post-operative recurrences. That the Röntgen ray manifests such a power is proved beyond a doubt, and the clinical experience of those who have thus employed it, with a correct technique, has amply confirmed the validity of this contention.

Reyburn¹ urges *tonic treatment* in cases of cancer in combination with operation, or whatever other active measures are employed.

VACCINATION, IMMUNITY, AND SPONTANEOUS RECOVERY. The experiments of Ehrlich, Sticker, Gaylord, and others with the mouse cancer has led to the hope that something may be accomplished in a curative way for cancer by inoculation or vaccination. As we have already noted, Michaelis does not believe the mouse cancer strictly analogous to cancer as it occurs in man. Moreover it is unquestionable that a fair proportion of the mouse tumors undergo retrograde metamorphosis and finally perish. According to Gaylord and Clowes,² there is absolutely no doubt of the occurrence of a spontaneous cure of cancer in mice. No less than 101 clearly defined cases came under their observation during the year just passed. The causes which led to such cures and the circumstances attending them are all obviously of the first importance.

The question of a spontaneous cure of cancer in human beings is of still greater interest and importance, and, although but few authentic cases are to be found in the literature, they acquire an added significance when considered in conjunction with the results in animals as recorded in their paper. Experiments on the transplantation of mouse tumors were commenced in their laboratory in the early part of the year 1904.

¹ Journal of the American Medical Association, vol. xlvii, No. 19, p. 1539.

² Surgery, Gynecology, and Obstetrics, June, 1906.

In the autumn of the same year several tumors, after reaching appreciable dimensions, were found to be undergoing spontaneous retrogression and eventually subsequent examination showed that they had entirely disappeared.

Up to the time of their report about 3500 mice had been employed in the laboratory for the experimental transplantation of a series of tumors. Of this number by far the larger part (over 2500) had received injections of materials derived from the Jensen tumor. Upward of 550 fatal tumors were obtained in this series, and, in addition, over 300 mice showed at some stage indications of a possible tumor development. In this latter series 101 cases of undoubted spontaneous recovery from true tumors which had reached such a size and age as to exclude the possibility of experimental error were collected and formed the basis of their communication.

That they have been able to tabulate these results and demonstrate the occurrence of such a large proportion of spontaneous recoveries is owing to the fact that they very early adopted a system of identifying the individual members of an experimental series and charting each mouse at intervals of five or six days from the date of the original inoculation. For this purpose chart books were employed in which the groups were arranged numerically and the individual members of a group alphabetically, and for each individual a series of diagrams was prepared, showing the fore-legs, hind-legs, nose, and tail. When a tumor made its appearance on the back of a mouse, it was reproduced in the diagram as nearly life-size as possible and in the location in which it occurred, and as the tumor increased in size and secondary tumors were produced further chartings were prepared, showing the progress of the tumor growth until the death of the animal occurred.

The authors have every reason to believe that the increased number of spontaneous recoveries in their records of the last twelve months, during which time they have employed their present charting system, is attributable rather to the improved method of laboratory observations than to any marked falling off in the virulence of the tumor materials, which have, in spite of intermittent variation, maintained a fairly uniform average.

Once aware of the frequency of spontaneous recovery from cancer in mice, one naturally turns to the literature in search of cases of this sort in human beings. There are many such cases reported, but very few withstand critical investigation. Many of them are obviously inflammatory lesions, syphilis, or Hodgkin's disease, which has been confused with sarcoma. There are others, however, which are, no doubt, true instances of a retrogression of carcinoma, but these are unaccompanied by histological diagnoses, which fact renders them useless for critical purposes. Owing to the failure to distinguish between tuberculous lesions and cancer, several cases reported in the early literature, which

are accompanied by histological diagnoses, must be rejected on that account. The result of our search in this connection, say Gaylord and Clowes, has led to the collection of 14 cases which, in our opinion, are authentic cases of spontaneous recovery. They include 2 epitheliomas, 1 scirrhus cancer of the breast, 1 malignant adenoma of the rectum, 7 cases of chorion carcinoma, 1 endothelioma, and 2 sarcomas. It is interesting to find that one of the most malignant forms of cancer—chorion carcinoma—should furnish the greatest number of authentic examples of spontaneous recovery.

The authors conclude that: (1) Spontaneous cure of cancer in the experimentally inoculated mice occurs in about 23 per cent. of the animals. (2) The chances of spontaneous cure are inversely proportional to the size of the tumor. The frequency of the occurrence and its distribution in animals suggest that it may be more frequent in human beings than is generally supposed. (3) The occurrence of spontaneous recoveries from cancer, indicating the existence of immune forces capable of terminating the disease, demonstrates that cancer is not necessarily incurable, and should serve as an additional stimulus to research directed toward the discovery of a serum therapeutic treatment.

The fact that the spontaneous cancer of a mouse is inoculated with such difficulty into other mice suggests the idea of some natural protection which is efficient except in the case of first injections with the virulent cancerous material obtained from successive transplantations. This led Ehrlich¹ to endeavor to produce an artificial immunity by the inoculation of attenuated virus. He found that animals so inoculated were resistant later to the most virulent cancer material. He was successful in from 66 to 94 per cent. of the series of tests.

Commenting on Ehrlich's work, the Editor of the *Journal of the American Medical Association* says: "The relatively slight infectiousness of spontaneous mouse carcinoma may be taken to indicate that the normal mouse possesses certain defensive mechanisms which prevent further proliferation of the tumor cells, unless these have acquired a specially high degree of virulence. It would follow that in spontaneous tumor formations the beginning of the cell change, called carcinomatous, may be quite the same in different animals and yet the subsequent course be widely divergent, owing to the varying degrees of individual resistance."

Sticker² made a series of experiments and found that tumors might be inoculated at two different points at the same time. In other words, a simultaneous multilocal inoculation is possible. After the implantation of a tumor, however, fresh inoculations are unsuccessful. When an

¹ *Journal of the American Medical Association*, vol. xlvii, No. 3, p 206; Berlin. klin. Woch., 1906, Nr. 2.

² Münch. med. Woch., 1904, S. 39.

implanted tumor is excised a fresh inoculation is possible, single or multiple, on the same day or later.

Jacobs and Geets¹ say very positively that: (1) There is in cancerous cachexia a specific microörganism—the *Micrococcus neoformans* of Doyen. (2) It is practicable to immunize the human organisms by means of a series of inoculations of the *Micrococcus neoformans*, provided that these are properly controlled by examinations of the opsonic power of the blood. They say they have cultivated the organism in 90 per cent. of the tumors examined; they have succeeded in producing localized or generalized neoplastic lesions in 30 per cent. of the cases by inoculating young and vigorous cultures of the microörganism into mice and white rats. The flimsy basis for most of the foregoing remarks of Jacobs and Geets may be inferred from the concluding statements: "We have selected, from the 46 cases which our statistics now comprise, those which appear to us most instructive for the clinical demonstration of our researches. We are far from speaking at present of an absolute cure. Time alone can verify the 'cures' which we report today. In all the cases which we have treated by this method we have noticed real and definite improvement. Where the body was worn out by the cancerous intoxication, the improvement was only transient, but it has remained after several months in the patients where the treatment (with or without operation) has been maintained; these cases exhibit an improved state of health which contrasts in a most striking manner with their former condition of cachexia. Our statistics of 46 cases are grouped as follows:

'Cure' maintained after several months	7
Lasting improvement	12
Transient result	7
No result	11
Now under treatment	9
	<hr/> 46 "

TRYPSIN TREATMENT OF CANCER. In directing the use of trypsin and amylopsin Beard² says: "After a few preliminary injections of small amounts (half an ampoule of the injectio trypsin), the course should be:

"1. Injectio trypsin daily up to two ampoules for three or four weeks.

"2. Then one ampoule of injectio trypsin on a certain day, followed by an ampoule of injectio amylopsin on the next day, and so on alternately for about four weeks.

"3. Lastly, one or even two ampoules of the new injectio amylopsin daily for about four weeks or longer, in the judgment of the physician.

"The injectio amylopsin, therefore, is meant to replace the injectio trypsin in the later periods of the treatment, and also even from the start to meet any bad symptoms, such as nausea, vomiting, pain in the

¹ Lancet, April 7, 1906.

² Journal of the American Medical Association, vol. xlvii, No. 6, p. 445

back, drowsiness, albuminuria, high arterial tension, edema, etc. If using this injection any injections be still not well borne, the injection should be further diluted and given more frequently, so that the total amount is not thereby diminished. It is easy enough to kill every cell of a cancer with injections of trypsin, but for its removal and to prevent the formation of poisonous products from its degeneration injections of the diastatic ferment of the pancreas gland, amyllopsin, are absolutely necessary."

Morton¹ has tried trypsin in the treatment of 30 cases, hospital and private; 2 cases of severe face cancer are cured to date. A cancerous breast has undergone degeneration and atrophy, and final and curative obliteration has been microscopically demonstrated. All cases have been benefited. It has been demonstrated beyond question that trypsin may produce local reaction in a cancerous tumor, indicated by swelling, heat, pain, and increased discharge. Enlarged glands associated with cancer have rapidly diminished in size under trypsin treatment.

Trypsin has a decided effect in reducing cancer and improving the general health. In severe cases of the uterus, involving associated pelvic organs, cancer may be brought to a halt, even though patients do not recover. Trypsin has caused hemorrhage to cease and has alleviated pain.

In all fairness trypsin deserves a further trial, but Morton says he reserves an opinion as to its actual therapeutic value until he can speak from a larger experience.

Odier² used glycolytic and pancreatic ferments by injection, because he found that in animals with spontaneous tumors the production of these ferments was below normal. He thinks glycogen indispensable to the growth of a cancer, and by destroying the glycogen he thought to prevent further growth of the tumor. He has experimented on a number of animals over a period of one to four years and in every case the growth was apparently arrested.

Zononi³ has been experimenting with trypsin in mice and has had results similar to those of Beard.

The whole of Beard's evidence from an experimental standpoint is found in his report⁴ of the injection of two mice afflicted with carcinoma. A control mouse also diseased was not injected. One of the injected animals died from accidental strangulation; the other was killed. The tumors in both cases were said to be in a marked stage of degeneration. In neither case is the tumor said to have been microscopically smaller than when the injections began. He says of the second mouse: "Even without further treatment the tumor would in all probability have been

¹ New York Medical Record, December 8, 1906.

² Presse médicale, June 30, 1906.

³ Journal of the American Medical Association, vol. xlvii, No. 8, p. 644.

⁴ British Medical Journal, January 20, 1906, p. 140.

absorbed shortly or its remains cast out. Though the number of experiments is small, already they have established what in advance I knew they would. This degeneration of an asexual structure (a malignant tumor or trophoblast) under intestinal (tryptic) digestion, I have witnessed again and again in past years. The experiments were not needed to convince me that trypsin would cause a cancer to degenerate in the same way that it does that of the trophoblast in its normal development. How such a conclusion can be arrived at is, I know, a mystery to many. It is solely by the use of the comparatively morphological and physiological method, of which my departed friend, Professor George Bond Hawes, was so ardent an exponent. In advance, I know that no matter how often we repeat this experiment, even with much smaller doses, the like results will invariably be obtained. In the nature of things it must be so, for in the cancer ferment (malignin) and in trypsin we have an antithesis of ferments, of which the latter is the more powerful. For reasons which cannot be entered upon now, it appears to be certain that the action of trypsin upon the cancer cells is to pull down the cancer albumin (a living substance) and the cancer ferment (malignin) produced by this. Apart from its origin and apart from the parasitic theories proper, the extant theories of the nature of cancer come under three headings: gametoid, trophoblastic or asexual generation, and embryonic or somatic. In addition to their confirmation of the conclusion that trypsin is the substance which will destroy the cancer cell with ease and without danger to the individual (Beard and Shaw-MacKenzie), these experiments go far to prove that in its nature cancer is neither germinal nor somatic, for trypsin, the architect of the soma, does not in life destroy the soma or sexual individual or its sexual products, whilst its action is direct and utterly ruinous upon trophoblast or asexual generation."

Concerning Beard's hypothesis, the editor of the *Journal of the American Medical Association*, says:¹ "We are not aware that aberrant germ cells have been demonstrated in human embryos and, if so, that they here also disappear with the development of the pancreas. Be that as it may, at this time we are more concerned with the effects of the trypsin treatment, more particularly as set forth in a recent popular article (*McClure's Magazine*, August, 1906) by one C. W. Saleeby, M.D., written, so it would seem, under the direct inspiration of its originator. Comment seems hardly necessary because there is no record here of any cure of cancer. The facts in regard to the cases are totally inadequate for an outsider to form any correct opinion of the actual state of affairs, and the manner in which the facts are given show that the reporter is not only highly inexperienced, but also deeply prejudiced. It is evident that this kind of exploitation of the trypsin treatment of cancer should

¹ *Journal of the American Medical Association*, vol. xlvii, No. 5, p. 364.

cease. It is not at all creditable to its advocates. If there are facts available bearing on the true merits of this treatment, let them be published fully so that their significance may be appreciated. Incomplete, premature, sensational announcements do harm only."

Luther,¹ after using Beard's treatment in a series of cases, makes a preliminary report, and concludes: "It is the consensus of opinion of all those who have applied the treatment, and in this I concur, that whatever else the treatment may do, it certainly does in most cases cause: (1) An arrest or shrinkage of the growth; (2) improvement in the general health; (3) diminution or cessation of pain; (4) diminution in the discharge and a decrease of fetor, except in those cases where sloughing occurs."

OTHER NEW TREATMENT. Speiss² thought the growth of a transplanted tumor depended directly on the amount of blood sent to the part, as indicated by the good results following the ligation of afferent arteries. He wondered what part the associated division of the sensory nerves had in such a procedure. He aimed to abolish the sensory irritation and thus the reflex irritation. He used nirvanin and novakain. He found that carcinoma implanted in mice was favorably influenced by injections of these substances, and under certain conditions—slow growth and early adoption of the method—could be healed. He tried it in eleven clinical cases. All cases were benefited, but they were so advanced that results were not expected. Czerny is giving this method trial at the new Cancer Institute.

FIBROID TUMORS OF THE UTERUS.

Etiology. Griffith³ believes that uterine fibroids have their beginning in a bursting of the small, delicately walled bloodvessels of the myometrium, allowing the blood to be poured out into the uterine tissues. The blood subsequently clots and goes through all the various stages of repair, leaving behind a small, probably microscopic bit of fibrous or scar tissue. This small bit of scar tissue acts as an irritant foreign body during subsequent menstrual periods, and as such it gradually acquires more and more fibrous tissue until in an indefinite period the fibroid is large enough to be recognized.

Pathology. A number of interesting and unusual *complications* have been recently reported. Thus Dickson⁴ notes a case of myoma in which there was a tuberculous infection of the tumor itself. Steinbüchel⁵ reports a case of torsion of the pedicle of a subperitoneal fibroma

¹ New York Medical Journal, February 23, 1907.

² Münch. med. Woch., liii, Nr. 40, S. 1948.

³ New York Medical Journal, September, 1906.

⁴ American Journal of Obstetrics, June, 1906, vol. liii, No. 6, p. 799.

⁵ Wiener klin. Wochenschrift, xviii, Nr. 37, S. 945.

with intraperitoneal hemorrhage and symptoms of collapse, the entire clinical picture resembling the rupture of an extra-uterine pregnancy. Stein¹ gives the details of a case of fatal intraperitoneal hemorrhage due to the bursting of a vein in a subperitoneal fibroid. This case also resembled extra-uterine pregnancy. Although these are rare complications they must always be borne in mind in our dealings with subperitoneal pedunculated tumors.

Semmelink and Jong² report a diffuse adenomyoma of the internal genitals involving all the structures except the Fallopian tubes and the cervix uteri. After a lengthy discussion and a thorough description of the specimen, they ascribe it to a mesonephric origin (v. Recklinghausen theory).

Winter³ says there is no tumor which may be associated with a greater variety of pathological processes than a fibroid tumor of the uterus. Situated in an organ which undergoes so many changes in size and physiological activity, and which becomes functionally inert long before senile alterations appear elsewhere, and which at the time of atrophy is subject to a variety of lesions, the growth is under many influences. For this reason it may undergo almost any form of degeneration, and it may produce effects on neighboring or distant organs. Thorough and careful examination of an old myoma will usually show some form of degeneration.

Myoma and Carcinoma. Although it is of the greatest rarity for carcinoma to develop within a fibroid [and it can never do this except in adenomyoma.—ED.], Winter thinks that a fibroid in the body of a myomatous uterus undoubtedly predisposes to the development of carcinoma. He draws his inference from the relative frequency of corpus carcinoma as compared with cervix carcinoma. Thus he quotes that:

Hofmeier	in 812 uterine cancers found	28 of the corpus.
Krukenberg	848 " "	57 "
Freund	227 " "	18 "
Küstner	234 " "	22 "
Winter	210 " "	62 "

Summing this: in 2331 uterine cancers there were 151 corporeal to 2180 cervical growths; in other words, a ratio of 1 to 15.

Contrasted with these figures:

Hofmeier	in 17 cases of cancer and myoma found	9 corporeal cancers.
Martin	9 " "	7 "
Geuer	46 " "	33 "
Winter (Berlin)	36 " "	23 "
Winter (Königsberg)	23 " "	8 "

¹ Monatschr. f. Geburtsh. u. Gynäk., xxii, Nr. 5, S. 637.

² Ibid., xxii, Nr. 2, S. 234.

³ Zeitschr. f. Geburtsh. u. Gynäk., lvii, Nr. 1, S. 8.

Summing this it is found that in 131 cases of fibroid and cancer combined there were 80 cancers of the body to 51 of the cervix, or a ratio of 1 to 6.

From these facts it is seen that cancer of the body is much more frequent in myomatous uteri than in those not so diseased. He believes that fibroids of the uterus predispose to cancer of the uterine body by causing hyperplastic conditions of the mucosa which gradually become malignant. The author asks further whether the relation between fibroid tumor and cervix carcinoma is one of cause and effect or purely accidental. In answer to this he quotes the statistics of:

Hofmeier, who found in 445 cases, carcinoma of cervix	8 times.
Freund, " " 72 " " "	1 time.
Winter, " " 753 " " "	16 times.

That is to say, in 1270 cases, cancer of the cervix occurred 25 times, or in 2 per cent of the cases. Although there are no definite figures in regard to the frequency of carcinoma in women without fibroids, there is not the slightest doubt, Winter says, that even in the countries where cancer is most frequent, such a ratio of occurrence is never reached. He believes, therefore, that it is an unevadable conclusion that fibroid tumor of the uterus predisposes to cancer of the cervix.

Frequency of Sarcomatous Degeneration. At the present time the frequency of sarcomatous degeneration cannot be exactly determined. An accurate percentage could be found only if every case of myoma was exposed to operation, and if every one of the specimens removed was painstakingly examined by means of the microscope. This microscopic examination would have to include not only the macroscopically suspicious areas, but also all parts in which there was any gross variation at all from the normal appearance. Rapidly growing myoma and irritated or inflamed ones may present a histological picture suggestive of sarcoma, so that a diagnosis of sarcoma to be invariably reliable requires an experienced man. In Winter's series of cases the diagnosis was entrusted to Prof. Beneke and Prof. Askanazy. The author divides his cases of myoma into two series. In the first of 500 cases the grossly suspicious areas only were examined for sarcoma; 16, or 3.2 per cent., of sarcomas were found. In the second series of 253 cases every spot in the tumor not entirely normal in its gross appearance was examined, and 11, or 4.3 per cent., of sarcomas were found. He believes that in about 4 per cent. of all cases a fibroid becomes sarcomatous. Sarcomatous degeneration is much more frequent in submucous than in other forms of fibroid. About 9 per cent. of all submucous fibroids become sarcomatous. Thus in 126 submucous myomas in Winter's series, 11, or 8.7 per cent., were sarcomatous, and in 86 submucous tumors reported by Hofmeier (v. Franque) there were 5 sarcomas, or 5.8 per cent.

Benign Forms of Degeneration. As benign forms of degeneration, the author speaks of atrophy, infection, acute nutritive disturbances, and degeneration of the intermuscular tissue. Infectious processes he dismisses at once, saying that they give abundant clinical evidence. The symptoms of total necrosis of the tumor and cystic softening, however, he thinks are not entirely clear. As causes for degeneration he notes emboli in the afferent arteries, hemorrhage, trauma, twisting of the pedicle, etc. The myoma cell is in itself less prone to degeneration than the cells of a malignant growth, but the changes in the amount of blood in the uterus incident to menstruation, pregnancy, and the puerperium greatly favor degeneration, and this is true of the dislocation of the tumor and the injury to its capsule which are incident to labor. 17 cases of total necrosis and 68 of cystic softening of fibroid tumors are considered in detail. Under the title of cystic softening are included myxomatous change, edema, and hyaline degeneration. In cystic softening the process begins either in the muscle cells or in the intermuscular connective tissue. The fluid in such a myoma is often lymph; in other cases it undoubtedly contains mucin and is the product of a myomatous degeneration. Winter found that such a form of degeneration occurred in about 15.5 per cent. of his operative cases.

Graves¹ reports 4 adenomyomas in a series of 100 fibroids. In 3 cases these were well-marked developmental defects of some part of the pelvic organs.

Noble² reports the degenerations and the complications of fibroid tumors in a series of 337 consecutive cases in his practice.

RELATIVE TO THE TUMOR OR THE UTERUS.	
<i>Condition.</i>	<i>Number.</i>
Adenocarcinoma of the corpus uteri	8
Epitheliomatous infiltration of a fibroid tumor arising from adenocarcinoma of the corpus uteri by metaplasia	1
Carcinoma of the cervix uteri	5
Sarcoma	2
Chorio-epithelioma	1
Necrosis of tumor	22
Myxomatous degeneration	8
Cystic degeneration of tumor	7
Calcareous infiltration of tumor	7
Twisted pedicle, pedunculated tumor	2
Hyaline degeneration of tumor	3
Intraligamentous development of tumor	21
Adenomyoma	4
RELATIVE TO THE UTERUS.	
Procidentia uteri	6
Retroversio uteri	6
Pregnancy, ectopic	3

¹ Boston Medical and Surgical Journal, March 15, 1906, p. 283.

² Journal of the American Medical Association, xlvii, 23, 1881; 24, 1993; 25, 2065.

RELATIVE TO THE OVARY.	
<i>Condition.</i>	<i>Number.</i>
Dermoid cyst	1
Dermoid cyst with twisted pedicle	1
Dermoid cyst, suppurating; sinus through abdominal wall from drainage operation	1
Dermoid cyst, bilateral; umbilical hernia	1
Ovarian cyst, suppurating	2
Ovarian cyst with twisted pedicle	1
Ovarian cyst, bilateral	3
Ovarian cyst, unilateral	24
Cystic degeneration of ovaries	11
Chronic interstitial oöphoritis, bilateral	2
Adenocarcinoma of ovary	1
Papillary carcinoma of both ovaries	1
Abscess of ovary, unilateral	3
Parovarian cyst	2

RELATIVE TO THE UTERINE LIGAMENTS.

Abscess of broad ligament	1
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RELATIVE TO THE FALLOPIAN TUBES.

Hematosalpinx	1
Pyosalpinx, bilateral	10
Pyosalpinx, unilateral	6
Hydrosalpinx, bilateral	11
Hydrosalpinx, unilateral	9
Salpingitis, bilateral	6
Salpingitis, unilateral	11

OUTSIDE OF THE TUMOR, UTERUS, AND APPENDAGES.

Chronic pelvic peritonitis	4
Appendicitis	17
Total	236

Diagnosis of Particular Forms of Complication or Degeneration. Winter, who believes that each case of fibroid must be studied individually in order to determine the indications for operation, has observed his myoma patients most carefully. He compares the clinical symptoms which they exhibited and compares them with the findings after operation.

CANCER. In speaking of the diagnosis of carcinoma of the body of the uterus as a complication of fibroid tumor, he says that there is difficulty because the symptoms arising from the cancer are so often mingled with and lost in those of the fibroid. In 4 out of 12 cases the diagnosis was not made previous to operation. The diagnosis in the other 8 cases was by accidental palpation of the cancer through a widely patulous cervix in 2; unexpected microscopic findings after curettage to control bleeding in 4; microscopic diagnosis in the presence of carcinoma symptoms in 2. The microscope plays the chief role in the diagnosis of corporeal cancer. From a study of his own cases the author believes that under certain circumstances the combination of fibroid and cancer may be suspected and a careful examination for cancer made. The most important

clinical symptom is hemorrhage after the menopause. In but one-third of such cases in Winter's hands were these symptoms caused by a myoma alone. Bleeding after cohabitation is another symptom which led to the diagnosis of cancer in addition to fibroids in one of Winter's cases. Pain at certain times is another symptom which may call for the diagnostic exclusion of cancer. The pain caused by a myoma itself usually occurs at the menstrual periods. At other times it may be especially suspicious of cancer. When the woman is at the menopause and when the pain is localized to the uterus, cancer may be suspected. Upon the grounds of his experience, he says that cancer of the corpus with myoma will be less frequently overlooked if the above symptoms are taken to indicate a diagnostic curettage, and if the curettings are examined routinely from every case of curettement.

The diagnosis of cancer of the cervix is readily made if the relative frequency of the complication is kept in mind and the cervix carefully examined.

SARCOMA. Regarding the symptoms which may lead to the diagnosis of a sarcomatous degeneration in a fibroid, Winter relates that in his 11 submucous cases the diagnosis was made in but 1. The consistency of a submucous tumor which has undergone sarcomatous change can be imitated by fibroids which have undergone inflammatory and necrobiotic processes. The subjective symptoms also are of little help; in 8 of his cases the symptoms were the familiar ones of submucous fibroids. In 1 there was hemorrhage after intercourse, and in 2 the hemorrhage made its appearance at the time of the menopause. None of the symptoms, however, are strongly indicative of sarcoma. As submucous tumors usually require some operative measure, it is indispensable to thoroughly examine every such tumor, even though it appears benign. A consistently radical attitude toward submucous fibroids would be justified by the fact that 9 per cent. of them become sarcomatous. After discussing various symptoms which might indicate a sarcomatous degeneration of an interstitial myoma, the author concludes that the sarcomatous degeneration of such a tumor can only be diagnosticated when the process is far advanced, and that the general condition and history of the patient is the surest evidence of a malignant change of this sort. This is practically his conclusion in regard to subperitoneal, sessile, and pedunculated tumors; he mentions the adhesions and the ascites which occur in sarcomatous forms, but adds that they may be observed as well in inflammatory and in simple forms.

NECROSIS. Total necrosis of a submucous fibroid is at once evident and the symptoms are well known. Total necrosis of a subserous myoma symptomatically resembles torsion of the pedicle of an ovarian tumor. It is superfluous to go further into details. In interstitial myomas, however, total necrosis forms a clinical picture which deserves a very exhaustive study. In his experience Winter has encountered the

complication in 6 to 8 per cent. of the interstitial tumors. He looks upon the complication as a serious one. The sum-total of his observations on the symptomatology show that the condition most frequently arises after labor or abortion; it is associated with irregular and often profuse hemorrhage and labor-like pains, and further on in the course of the disease the symptoms of auto-intoxication.

CYSTIC DEGENERATION. In regard to the symptomatology of cystic degeneration of a fibroid, the author says that a primary softening of an interstitial myoma is almost regularly associated with serious hemorrhage, but that beyond this there is no particular local or general symptom or disturbance in the general nutrition which indicates it. Winter says that as cystic degeneration is a purely local affair it does not influence the general economy.

Greenbaum¹ concludes that in cases of calcareous degeneration the diagnosis may sometimes be made by direct palpation of the hard, calcareous particles. Aside from this, a diagnosis may be based on the age of the patient, the density of the tumor, the pressure pain and symptoms of compression of the neighboring organs, the increase of pain without enlargement of the tumor, in rare cases from bleeding, and finally because of the tendency of such tumors to be early infected.

It is quite evident that the effort of Winter and others to diagnose the various forms of degeneration of fibroid tumors from the clinical symptoms is, at least partly, a failure. Certainly, however, gynecologists should strive toward this end, and for this reason I have given, in more or less detail, the observations bearing on this subject.

Choice between Myomectomy and Hysterectomy. Several years ago I noted Winter's indications for myomectomy. That author, after a thorough examination of the subject, relegated myomectomy to a certain line of cases. His conclusions have been verified by most observers.

Graf² reports 39 cases of myomectomy done in Schauta's clinic at Vienna. In 15 cases an examination was made subsequent to the operation, in 15 letters were received from the patients, 7 could not be located, and 2 had died from intercurrent disease. In only 1 case, although there were many young patients, did pregnancy occur, and that was interrupted by abortion at the third month. One recurrence the size of a hazelnut was discovered; once the uterus was enlarged, uneven, and nodular. Several times the uterus was enlarged *in toto*, hard, but without a circumscribed tumor.

In a relatively large number of cases there was pain for a year following the operation, which seriously interfered with the occupation of the patient.

Noble³ says that at the present time, in contrasting myomectomy

¹ Archiv f. Gynäk., lxxx, Heft i, S. 212.

² Zeitschrift f. Geburtsh. u. Gynäk., lvi, Nr. 1, S. 103.

³ New York Medical Journal, May 19. 1906.

with hysteromyomectomy, the chief points of comparison are the relative dangers of the two operations and the fact that myomectomy leaves the woman with all her sexual organs, whereas hysteromyomectomy as usually performed leaves her without uterus and ovaries, and without menstruation and the possibility of maternity. It is true that menstruation is preserved by one of the modifications of hysteromyomectomy practised by Zweifel, of Leipzig, which consists in leaving one or both ovaries, and amputating the uterus at a high level, so that a certain amount of the endometrium is preserved, but in this operation the possibilities of maternity are sacrificed.

As an abstract proposition everyone will agree that an operation which preserves the functions of menstruation and the possibility of conception is superior to one which sacrifices both, and were each operation equally feasible and equally curative, hysterectomy would be abandoned and myomectomy uniformly practised. Unfortunately, the question in this form is academic and not practical. Many women with fibroid tumors have passed the menopause, others have passed the period in life when the possibility of childbearing is not a question of much importance, so that in probably the large majority of women having fibroids the preservation of the uterus from the standpoint of pregnancy is a matter of little or no importance.

In contrasting the relative advantages of myomectomy and hysteromyomectomy, the question of the artificial menopause must be considered. If both ovaries and the uterus are removed together with the tumor, the menopause is precipitated. It is usually alleged that the artificial menopause, as contrasted with the natural menopause, is far more troublesome; that in the former the symptoms of the normal menopause are exaggerated, and that a considerable percentage of women are made physical wrecks as a consequence of the artificial menopause.

It is Noble's opinion, based on observation, that this view is greatly exaggerated. As a rule, the artificial menopause corresponds exactly in its symptoms to the normal menopause. In young married women who have not had children postclimacteric atrophy of the vagina at times causes serious inconvenience in the marital relations. Occasionally the hot flashes, the sweats, the tinglings, the numbness, and the mental depression, which are characteristic of the natural menopause, are exaggerated in the artificial menopause, but he has not been able to satisfy himself that the cases with exaggerated manifestations are more common after the artificial than the natural climacteric. It is his judgment that the extreme cases which have called attention to this question and have led to the current views occur in highly neurotic women known as cranks. It has been proposed to leave one or both ovaries if they are healthy when hysteromyomectomy is performed. His own views upon the question of the artificial climacteric being what

they are, he has practised the plan but seldom, and in the limited number of cases in which it has been followed he has not been able to observe any difference in the course of the cases from those in which both ovaries have been removed.

It is also an interesting question as to how frequently pregnancy and full-term delivery occur in women upon whom myomectomy has been performed. In Noble's experience, in 44 vaginal myomectomies there was 1 pregnancy with delivery at full term; in 22 abdominal myomectomies there were 2 pregnancies, with 1 delivery at term and 1 miscarriage.

Summing these cases up gives a total of 94 myomectomies, with 9 pregnancies, or about 10 per cent.; and considering the proportion of miscarriages the conclusion is inevitable that, even in women of child-bearing age in whom myomectomy is feasible, less than one-tenth of them will bear children. Myomectomy preserves the possibility of conception, but the probability of it is slight, and in most cases the advantage to the patient lies rather in the fact that the woman has the hope of conception, as contrasted with the certainty of having lost it. From the practical standpoint the conclusion is inevitable that, so far as the question of pregnancy is concerned, it is of little moment except in the group of women who ardently desire to bear children, and that in considering the question of hysterectomy *versus* myomectomy in a woman who does not so express herself, the question of pregnancy is usually of small practical importance.

As a rule fibroid tumors are multiple. Two, three, four, or many fibroid tumors exist in the same uterus. Therefore, in a given case in which myomectomy is practised there is always the possibility of overlooking tiny fibroids, which later may develop, with the result that the last state of the woman is as bad as the first. The latest statistics of the German authorities show that in abdominal myomectomy there are 6.4 per cent. of cases in which the further development of tumors took place, and if the submucous tumors are included the percentage of recurrences reaches 8 per cent. In the author's experience of 66 cases no instance of a new development of a fibroid tumor has been encountered.

The next question of practical importance is the relative value of hysteromyomectomy and myomectomy in curing the patient of her symptoms. According to Winter myomectomy is curative in 73 per cent., while the radical operation is curative in 97.3 per cent. Noble's experience has not been dissimilar, but as his cases for myomectomy have been rigidly selected, and as myomectomy has not been performed in cases in which its value was questionable, the proportion of cures is probably higher than the estimate given by Winter.

The relative dangers of the two operations, after all, constitute the chief basis for the selection of one operation or the other. At the Johns

Hopkins Hospital there have been performed 308 abdominal myomectomies, with 14 deaths, or a mortality of 4.5 per cent., as compared with 691 hysterectomies, with 22 deaths, or a mortality of 3.1 per cent. (private communication).

The reports of Winter and others show a mortality from abdominal myomectomy of 9.8 per cent., and from supravaginal hysteromyomectomy of 4.8 per cent. The conclusion to be drawn naturally is that myomectomy is more dangerous than hysterectomy. The figures alone do not show the entire truth, as cases in which myomectomy is feasible are those in which the mortality from hysterectomy would be practically zero, myomectomy never being performed in complicated and especially in septic cases. In Noble's experience in 42 vaginal myomectomies, there were 2 deaths; 1 patient died of embolism after the removal of a sloughing fibroid polyp; the second died from an endocarditis, which antedated the operation. In the series of abdominal myomectomies there was one death, which was due to infection of the perineum following a perineorrhaphy done during the same operation. In addition to the mortality the morbidity must be considered, which is much greater after myomectomy, a considerable percentage of the women recovering after a stormy convalescence due to hemorrhage or to peritonitis.

"The conclusion to be drawn from all the facts, it seems to me," says Noble, "is that the field of myomectomy is a limited one. In my practice there have been 66 myomectomies out of a total of 337 operations for fibroid tumors. I am not inclined to broaden the field of myomectomy beyond this proportion. If I were to make any change in my practice it would be in the direction of increasing the proportion of vaginal myomectomies in comparatively young women in whom it is still desirable for pregnancy to occur. Vaginal hysterotomy combined with anterior colpotomy will enable the surgeon to remove submucous and partly intramural fibroids with safety in many cases. Otherwise I shall continue, in the future as I have in the past, to limit the field of myomectomy to the removal of fibroid polyps and submucous fibroids by the vaginal route, and subperitoneal fibroids, when single, or at all events limited to two or three tumors, occurring in childless women less than forty years of age, by the abdominal route."

Supravaginal or Panhysteromyomectomy. Cullen¹ thinks that the possibility of the development of a malignant growth in the cervix following an operation for fibroid tumor does not necessitate the substitution of panhysterectomy for the supravaginal operation. The latter is the easier operation. It leaves a better support to the pelvic floor; in performing it there is less danger of tying the ureters; and as the blood supply of the bladder is little interfered with, there is less likelihood of

¹ Journal of the American Medical Association, vol. xlv, No. 10, p. 625.

a postoperative cystitis. The possibility of sarcomatous degeneration of the tumor or of cancer of the endometrium existing at the time of operation should lead to not only a thorough examination of the cervix and the endometrium after supravaginal amputation is done and before the abdomen is closed, but the fibroid nodules themselves should be examined to see if there is any indication of sarcomatous change.

Lumpe¹ reports a case of carcinoma of the cervical stump after supravaginal hysteromyomectomy.

Currier² believes that a more careful clinical and histological examination of fibroid uteri in cases of supravaginal hysteromyomectomy would result in the discovery of cancer in a large number of cases in which it is not suspected. He would also suggest the examination of such patients at six months' interval following operation. Complete removal of the uterus should be the invariable rule if the patient's history reveals any condition which suggests the possibility of future malignant degeneration of the tissues.

The Necessity for Operative Treatment of Fibroids. Grimsdale³ says the treatment of fibroid tumors of the body of the uterus has been revolutionized, and it is now quite unnecessary to wait for severe symptoms before recommending operation for the relief of the patient. The possible effect of the menopause may be almost ignored. In competent hands the operation of abdominal hysterectomy has now a lower mortality than the disease.

Sippel⁴ agrees that operation is less dangerous than palliation. He compares 47 cases operated on with 27 unoperated cases. After a number of years none of the former were dead. Of the latter, he knows himself of 2 deaths from hemorrhage, 3 from pulmonary embolus, and 1 from a simple bronchitis in a patient weakened by myoma.

Crossen,⁵ after a very thorough review of the recent literature, comprising the articles for and against operative interference in myoma, concludes:

"1. A fibroid tumor of the uterus which has reached the size to be appreciated clinically is a much more serious affection than is generally supposed. A considerable proportion of the patients develop fatal local conditions, another considerable proportion develop serious distant visceral degenerations, and a large proportion of the remainder (possibly most of them) finally pass into a condition of chronic suffering and invalidism.

"2. The progress of the disease is so slow as to be deceptive, many cases taking fifteen to twenty years to reach full development; hence the serious

¹ Centralblatt f. Gynäk., xxix, Nr. 44, S. 1354.

² New York Medical Journal, July 28, 1906, p. 166.

³ Liverpool Medico-Chirurgical Journal, July, 1906, p. 211.

⁴ Münch. med. Woch., lii, Nr. 47, S. 2272.

⁵ Journal of the Missouri State Medical Association, September, 1906, p. 129.

results do not appear in the observation of a series of cases for a few years, a few years constituting but a fraction of the developmental period. Yet the widespread teaching that serious conditions develop in only a very small proportion of the cases is based largely on limited observations recorded and unrecorded. No large series of consecutive cases followed to the end without operation has shown a small mortality.

"3. Uterine fibroid kills principally by inducing serious local and general complications that go down in the mortuary records as the cause of death; hence mortuary records give no indication of the ravages of the disease. It kills secretly and indirectly, but none the less surely.

"4. The proportion of the various classes that (a) go on to fatal termination, or (b) become chronic sufferers and invalids, or (c) develop no serious symptoms, can be exactly determined only by securing accurate records of a large series of cases, comprising all classes from the beginning of the trouble to the end.

"5. Enough is already known to show that delay is dangerous. Many patients develop fatal conditions, many find operation necessary when in such a state as to make the operation exceedingly dangerous, and some must be refused operation because of advanced complications, nearly all of which loss of life and health could have been prevented by early operation.

"6. The chance of satisfactory improvement after the menopause is, speaking generally, more than overbalanced by the frequency of serious degenerative changes and complications.

"7. We assume a grave responsibility when we advise a patient to wait until serious symptoms develop before having the tumor removed. Early operation, under proper conditions, means small risk to the patient. Late operation means great risk."

Maury¹ believes in removing tumors which cause symptoms. Brown² has the conviction that the interests of the patients are conserved best if palliative measures are discarded and fibroid tumors are removed, whether they are at the time giving rise to distressing symptoms or not. This belief is based on the knowledge that the death ratio from the removal is now less than 1 per cent. in individual statistics to 4 per cent. in combined statistics, while with patients who have fibroid tumors and are not given operation the mortality directly and indirectly the result of these tumors is at least 10 per cent. Further, in removing the intra-pelvic smaller tumors there is less risk to the patient and a greater possibility of saving the uterus. This is not, however, intended to include the small fibroid nodules recognized only by one with trained touch and occurring in women near the menopause. Such conditions need no interference unless they show a tendency to increase in size.

¹ Southern Medicine and Surgery (Chattanooga), October, 1906, p. 61.

² Medical Record, vol. lxx, No. 4, p. 135.

Sarwey,¹ after reviewing 430 operative cases of myoma at the Tübingen Clinic (Döderlein) says: that the general mortality of the modern myoma operation reaches primarily 4 to 5 per cent.; the mortality of the vaginal operation is about 1 to 2 per cent. higher than that of the abdominal operation; the conservative operations also are higher than the radical operations—about 1 per cent. Myomas are frequently complicated either by conditions affecting the tumor itself or by diseases of the neighboring organs, without any direct connection with the tumor. These complications frequently increase the danger to life and demand on this account operative measures: if the latter are not undertaken or if they are done late, there will be a tendency to a fatal result. The view of former days concerning the benignity of fibromyomas of the uterus is wrong. This is especially true of the myomas of elderly women, in whom the menopause is delayed for a more or less length of time over the age of 45 in from 80 to 90 per cent.; after the onset of the menopause the danger of benign and of malignant degeneration of the tumor is greatly increased. Quiescence and atrophy in a climacteric age is not so much a matter of course as has been previously supposed.

The permanent results of the radical operation, with the extirpation of both ovaries, is the best that one could imagine. The exaggerated symptoms of an artificial climacterium, which are so much spoken of, the author did not encounter in more than one-third of all cases, and in these the symptoms were not sufficiently bad to interfere with the occupation of the individual. There is danger, moreover, in conserved ovaries that they may become the seat of secondary tumor formations. Conservative operations are associated with disadvantages which do not belong to the radical operations. These are the possibility of a recurrence of fibroid tumors and with them of pain; the danger of uterine rupture, too, from scars in the uterine wall is not to be left out of consideration.

Youthfulness of the patient and the marked wish of the patient to retain the menstrual function and the possibility of conception are the only factors in favor of conservative operation. The present improvement in the primary result and the excellent permanent results of the modern myoma operation, in combination with the many dangers inherent to myomas, teach us to broaden the indication for operative treatment and not lose valuable time with symptomatic treatment. An operation is indicated not only by well-marked danger to the patient from the myoma, but also by continuing myoma symptoms which are uninfluenced by treatment as well as by any subjectively or objectively recognizable aggravation of the symptoms. The pros and cons of operation should be explained to the patient.

Reed² says that the only cases of fibroids in which any question as to the expediency of an operation may arise are those in which the tumor

¹ Archiv f. Gynäk., lxxix, 2, p. 277.

² British Medical Journal, November 3, 1906.

does not cause hemorrhage or exert pressure, or present evidence of either infection or malignancy, or that has ceased to grow and in which some condition, not connected with the tumor itself, makes operative interference the more dangerous policy. Patients who choose to adopt a waiting policy should be apprised of all of the dangers incident to such a course and should be admonished to place themselves under professional observation at frequent intervals.

Noble¹ says that in his total experience the estimated mortality from complications outside of the tumor and uterus was 15 per cent., as compared with 11 per cent. for the mixed series of 2274 cases, and in his last 100 abdominal hysterectomies it was 23 per cent. as compared with 11 per cent. in the total series. This would indicate that the cases coming under his care not only represented the average in gravity, but were worse than the average. This was true both of the degenerations and complications in the tumor and uterus, and also of the complications outside of the uterus.

In discussing his former papers there was an attempt on the part of some to cause confusion by the claim that complications outside of the tumor and uterus had nothing to do with the question of whether or not fibroid tumors should be operated on. It is undoubtedly true that this question is secondary and relative and not primary. It is none the less a fact that of the 2274 women, upward of 11 per cent. would have died of the complications outside of the tumor and uterus without operation, and in the author's experience it is true of 15 per cent. in 337, and of 23 per cent. in the last 100 hysterectomies. Therefore, the existence of these complications does have a positive bearing on the percentage of cases in which operation is required in women having fibroid tumors. Not only complications which would be fatal, but also numerous other complications enumerated in the tables, would demand operation even if the fibroid tumors were not present. With the abdomen once opened one would be more than a confirmed upholder of the legends and the traditions of the profession to remove the complicating or associated conditions and to leave the fibroid tumor, when both can be removed at the same time.

The same facts might be stated as follows: The complications outside of the tumor and uterus, or if the term is preferred, the associated conditions present in women having fibroid tumors, the diagnosis of which was secondary to that of fibroid tumor, and which was perhaps obscured by the presence of the tumor, and discovered only during operation on the tumor, or from the pathological study of the specimens thereafter, which associated conditions, if neglected or treated by the expectant plan advised by the adherents of the classical position, would have resulted in the death of 11 per cent. of the 2274 women.

¹ Journal of the American Medical Association, vol. xlvii, No. 23, p. 1881; No. 24, p. 1998; No. 25, p. 2065.

FIBROID TUMORS PRODUCING FEW OR NO SYMPTOMS—ORDINARY TYPE. As indicated by the tables which Noble compiled, at least two-thirds of all fibroid tumors are complicated. It is his observation that it is rare to encounter fibroid tumors which are not producing symptoms. If the tumors do not produce symptoms, the women do not consult a physician. Occasionally, of course, a pelvic examination is made for some other reason, such as to ascertain the cause of sterility, and in this way an accidental diagnosis of a fibroid tumor is made. But experience fully bears out the teaching of the tables, that it is the exception for a fibroid tumor to be present and not to produce symptoms. At present Noble has under his care or knows of 8 women who had small fibroid tumors for years, which had not grown and which had produced but a few symptoms. All these women were advised to await events. In 2 of them trouble ensued: in 1 a fibroid nodule became submucous and caused such active bleeding that it was necessary to do a hysterectomy at the age of fifty-four, the operation incidentally curing a supposed neuritis in the left leg which was merely a pressure symptom; in the other a fibroid tumor became polypoid and was thrown off from the uterus without special pain, and was removed as a pedunculated growth within the vagina, the indication being hemorrhage. This patient still has a small subperitoneal fibroid about as large as an English walnut. Other cases of fibroid tumors have passed through the author's hands, refused advice, and disappeared from notice, but these 8 cases include all those of which he has personal knowledge as to the relative innocence of these growths: 2 of them have been driven to operation, and *this may prove to be the result in the remaining 6.*

EXPECTANT TREATMENT IN UNCOMPLICATED FIBROID TUMORS OF THE UTERUS. As shown by the tables in 2274 cases of fibroid tumors, complications or degenerations existed in 1553; that is, two-thirds were complicated cases and one-third were uncomplicated; also that in about half the cases the complications were such that an operation would be required had no fibroid tumor been present.

This represents the facts as to fibroid tumors when they come under the observation of the gynecologist. The advocates of the traditional teachings concerning fibroid tumors will claim that this is true only of a class, and that many women having fibroid tumors do not consult a gynecologist, and that those who do not have no complications. Doubtless there is an element of truth in this claim, but, as stated elsewhere in this paper, it is far more than offset by the failure to record degenerations and complications in the reported series. So far as it is possible to arrive at truth by the statistical method, it is Noble's opinion that the table furnishes an understatement rather than an overstatement of the facts. A careful reading of the list of degenerations in the tumor, the complications in the uterus, in the uterine appendages, in the ligaments of the uterus, and elsewhere in the abdomen will convince the inquirer after

truth that a large proportion of the women having fibroid tumors would require operation even if no fibroid tumor were present.

In estimating the present mortality of operations for fibroid tumor of the uterus, Noble has found a general average of 2.26 per cent. In estimating the comparative risks of fibroid tumors of the uterus pursuing their natural course with the risks of the removal of these growths, there is, on the one hand, a prospective mortality of from 15 to 20 per cent. from degenerations and complications in the tumor and uterus, together with the secondary effects of these tumors on the economy; and, in addition, a prospective mortality of 11 per cent. from complications present outside the tumor and uterus, or a total mortality approximating 30 per cent., to compare with the operative mortality of 2.26 per cent. It would seem that there could be no question as to which is the safer policy in the treatment of fibroid tumors, and that the prompt removal of these growths is the method to be chosen. On the other hand, the advocates of the traditional teaching might claim that as the tables indicate that only 30 per cent. of the patients would die without operation, the proper method of procedure is to operate on the 30 per cent., and to pursue an expectant plan of treatment in the remaining 70 per cent. Leaving aside the question of invalidism, which is present in a large proportion of cases of fibroid tumor, and considering only the prospect of the patient from the standpoint of the degenerations and complications in the tumor and uterus, if a woman in the group which it is proposed to treat by the expectant plan was told that under this method of treatment her chances to die of cancer of the body of the uterus were 2 per cent., of cancer of the cervix uteri were approximately 1 per cent., of sarcoma were approximately 1.5 per cent., of necrosis of the tumor were approximately 5 per cent., of cystic degeneration were 2.5 per cent., not to speak of the other less frequent fatal complications; while, on the other hand, she could have her tumor removed with the risk of 2.26 per cent., and could escape the months and years of semi-invalidism otherwise entailed, Noble believes that no woman of sound mind would hesitate as to what her choice should be. Moreover this does not represent the facts, since the most ultra-representative of the classical school would operate on about half of the women because of complications or associated conditions outside the uterus, in addition to the number he would operate on on account of symptoms caused by the tumor.

It has been urged by various men, supposing all the facts with reference to fibroid tumors which have been given are true, that it is unwise to teach that these growths shall be removed unless they threaten life at the time they come under observation, on the ground that if this teaching is accepted the occasional and inexperienced operator will attempt the removal of these tumors with a high mortality. Noble thinks that the proper reply to this teaching is that science deals with truth. If the facts are as they appear to be they should be accepted,

and this is not modified by the patent fact that an untrained, inexperienced, or bad surgeon is far more dangerous than almost any type of tumor. It is a misfortune for the community that all those who practise surgery are not well trained, and that many are unwilling to serve a proper apprenticeship before attempting major surgery; but while this is patent and unfortunate, it should not prevent us from acknowledging the truth.

THE INFLUENCE OF TRADITION AND THE FORCE OF HABIT AND FASHION. It is easy to admit the influence of tradition, habit, and fashion in the practice of surgery. Some gynecologists will open the abdomen for the displacement of the uterus or of the ovary, will break up a few adhesions, or will remove an inflamed Fallopian tube, a hydrosalpinx, a parovarian cyst, a Graafian follicle cyst, or a corpus-luteum cyst, or will remove the vermiform appendix in the interval, when the patient is in good health, and will do these things with a clear conscience and the feeling of duty well performed, but will dispute about the conditions under which a fibroid tumor should be removed. Nevertheless, a fibroid tumor is many times more dangerous to life than any of these morbid conditions.

Those gynecologists who adhere to the traditional attitude toward fibroids claim that an operation should not be done on a fibroid tumor because of what may happen in the future, and that operation is only permissible when life is threatened by the tumor, or when the symptoms present make life miserable or insupportable; yet the same men violate their supposed principles whenever they do an early ovariectomy or remove a vermiform appendix in the intervals between the attacks of appendicitis. In other words, their attitude toward operation for fibroids is the result of the influence of custom and fashion. They have accepted early operation to avoid future trouble for the other morbid conditions enumerated, but have not yet recognized that the same principle is equally applicable to fibroid tumors.

THE IMPORTANCE OF ACCURATE RECORDS OF OPERATIONS IN THE STUDY OF FIBROID TUMORS. In order to arrive at the facts concerning fibroid tumors it is essential that the conditions found at operations should be exactly recorded and that the specimens removed be studied from the pathological standpoint, and the clinical diagnosis corrected by the laboratory findings. This must be done systematically in every case. If this were done by all gynecologists and surgeons, and if after two years the actual results of two years' work were published, enough material would be accumulated to decide practically every question concerning fibroid tumors. Noble expresses the hope that enough men will be interested in the further study of this question to follow this method. In no other way can the facts be determined. He believes that it will be found that cancer of the corpus uteri is a much more frequent complication of fibroid tumors than is believed at present. This

may also be true of sarcoma, and it is certainly true of necrosis, cystic degeneration, pressure by the tumor on the urinary organs (bladder or ureters), and pressure by the tumor on the bowels.

THE ADVANTAGES OF EARLY OPERATION. The evidence presented is an ample demonstration of the soundness of the conclusion that it is the part of wisdom to remove fibroid tumors as soon as they are discovered unless in particular cases some sufficient reason exists to vary the general rule. In other words, that the principle of early operation which is now generally accepted with reference to ovarian tumors is equally applicable to the treatment of fibroid tumors. The existence of constitutional disease may render operation unadvisable because of the risk involved. The desire for child-bearing in a young and childless woman may properly influence the temporary postponement of an operation or decide the question in favor of a myomectomy rather than a hysterectomy. In other cases in which the tumor is small and especially when it is subperitoneal, and in which the symptoms are slight, the question of operation is still debatable. Which is the more dangerous operation, or the risks inherent in the natural history of such tumors? Noble thinks that this question must be left to the future, and that the decision will depend chiefly on whether or not cancer of the uterus occurs as frequently in this particular group of cases as in the whole series. Should this prove to be true, the question will be decided in favor of operation. The evidence presented, it seems to him, demonstrates the soundness of the teaching that a fibroid tumor should be removed because of the dangers inherent in the natural history of the disease, and not because of the particular symptoms complained of when the woman comes under the observation of the physician.

Early operation offers the following great advantages over the expectant method of treatment:

1. It saves long years of invalidism or semi-invalidism.
2. It enables women to fulfil the duties which devolve on them instead of having their activities limited in an effort to reduce their symptoms to the minimum and to prevent accidents to the tumor.
3. It avoids the risks to life from the development of sarcoma in the tumor and from the development of cancer in the uterus, more especially in the corpus uteri.
4. It avoids the risks to life from degeneration in the tumor, such as necrobiosis, necrosis, secondary septicemia, cystic degeneration, such accidents as twisted pedicle, pressure on the urinary organs, pressure on the bowels; anemia, cardiovascular degeneration, thrombosis, phlebitis, and embolism, malnutrition, and the greater liability to intercurrent diseases arising from lowered vitality, due to anemia or to malnutrition.
5. It greatly lessens the risks of operation. It is only necessary to contrast the risk of removing a fibroid tumor or of performing a hysterectomy for fibroid tumor in a relatively young woman with good general

health and with none of the secondary ill consequences which arise from the continual development of the tumor, to similar operations on a woman reduced by hemorrhage or suffering from malnutrition due to disturbances of the functions of the intestine, or on women having secondary cardiovascular or renal degenerations, to appreciate what is gained by early operation.

Early operation would probably eliminate or certainly reduce to the minimum deaths from embolism, which are relatively so common after operations when performed late in the natural course of fibroid tumors. The mortality from operation for fibroid tumors performed early would be reduced to 1 per cent. or less, as compared with probably 5 per cent. when the operation is performed under conditions as they exist at the present time.

Thomas Wilson¹ concludes that uterine fibroids are extremely common, but only a small proportion give rise to symptoms; in 30 per cent. of those that do the consequences are so serious as to demand operative treatment. Of the other 70 per cent., some with no active symptoms merely require watching, while the others call in addition for medical treatment, under which heading may be included minor surgical and other local means. Medical treatment may be direct or symptomatic. The direct or absorptive treatment does not promise much advantage, especially if we bear in mind the many sources of fallacy that interfere with a correct appreciation of the results of treatment. Symptomatic treatment is successful in many cases in tiding the patient over a crisis and in obviating the necessity for operation. Bleeding is most often successfully treated by rest and ergot. Pain requires treatment adapted to its cause; alcohol or morphine should only be administered in temporary and exceptional circumstances. The general condition of the patient and especially the state of general nutrition and the cardiac and renal functions should be carefully watched. And finally, operation should be recommended when bleeding gives rise to anemia and does not yield to ordinary treatment; when pain is severe and obstinate; when pressure symptoms, especially retention of urine, occur; when the tumor is rapidly increasing in size; and generally when there is evidence that the health of the patient is becoming impaired and that such impairment appears to be referable to the uterine fibroid.

The complication of fibroid tumor of the uterus by carcinoma, declares Winter, would be of sufficient import to indicate the removal of all fibroids only in case it occurred very frequently.

Hofmeier in	445 myomas found	9 cancers of the fundus.				
Fehling	409	"	1	"	"	"
Winter	753	"	10	"	"	"

That is to say, in 1607 myomas there were 20 corporeál cancers, 1.2

¹ Lancet, December 30, 1906, p. 1886.

per cent. Such a frequency does not indicate a removal of every myoma, but the fact must always be remembered so that cancer may be recognized promptly when it occurs and operative removal may at once be adopted.

The fact that carcinoma of the cervix occurs in a great percentage of fibroid cases does not, he says, form an indication for operative treatment of every case of fibroid. Cancer of the cervix should be looked for and of course when found the surgeon's course is self-evident.

The principal point of interest in this connection is whether there is a sufficient reason for preferring supravaginal to panhysterectomy. After noting the cases on record in which the cervix had subsequently become the seat of carcinoma, following supravaginal hysterectomy, he finds that in the greatest part of such cases it had existed at the time of the first operation and was overlooked. He thinks, therefore, that there need be no substitution of panhysterectomy for the supravaginal operation.

Winter's attitude is practically the same in respect to all of the degenerations or complications of fibroid tumor. The fact that 4 per cent. of fibroids undergo sarcomatous change is no indication for operation *per se*. Neither is the frequency of total necrosis or of cystic degeneration an indication. Each case should be carefully watched, and if any symptoms indicative of any of these conditions are found, then operation is indicated.

From this very full summary of Noble's and Winter's papers we have observed two divergent plans: one, the radical policy of Noble; the other, the more conservative of Winter. There is no question but that Noble has made a very masterful review of a large series of cases, but I must confess that to apply a wholesale operative policy for all cases of myoma does not appeal to my own feeling, based upon my own experience. The conclusion of Winter is, therefore, more acceptable, for he bases his operative decision not upon the fact that a tumor is present, but upon the actual events in the symptomatology of the case. Thus, and I believe very rightly, he claims that all of the degenerations and complications which may prove dangerous will give inevitable symptoms; symptoms which have been formulated under well-defined groupings, and have been very frequently reiterated in many articles and textbooks. It is of course true that a specialist very likely sees the cases which are really giving rise to symptoms which justify surgical intervention, and therefore even the conservative gynecologist will operate upon a vast majority of cases consulting him. In my own practice I am seeing at the present time, at periods of four to six months, 4 patients who have fibroids. Some of these cases have been observed for periods of over four years, and yet no symptoms have developed which would justify even the slight danger of an operation, for the patients are, to all intents and purposes, well women, capable of attending to every duty

in their daily lives. This, of course, is a very small percentage of cases compared with the number which have been operated upon in the same time. A sufficient number, however, to justify my inclining toward the plan of Winter, to let each case be measured by its own standards, rather than the policy of myoma, *ergo* operation.

ENTEROPTOSIS.

Enteroptosis in its Relation to the Gynecological Diseases. R. R. Smith¹ says that enteroptosis is no longer to be regarded as simply a ptosis of one or more of the abdominal organs, but as a distinct habitus characterized by flabbiness or hypotonus of the body tissues, by a lack of body energy, and by a more or less backwardness of development. If we examine such patients he says we note a long, narrow, shallow, and usually more or less collapsed thorax, flaccid abdominal walls, prominent abdomen, changes in the character of the spine, and a general relaxation and flabbiness of the muscular and connective-tissue structures. This, as a rule, is combined with abnormal lightness of weight. There is a ptosis of the abdominal viscera, perhaps displacement of the pelvic organs. Combined with these objective symptoms there are subjective phenomena of which the principal are general weakness and inability to carry on work without exhaustion, nervousness, oftentimes melancholia, constipation and disturbances of digestion, and other functions such as those of menstruation and urination. There is commonly pain in the back, one or both sides, and in the lower abdomen; there is also bearing-down pain and leucorrhea. In studying the body form in the normal woman the thorax is somewhat relatively longer than man; it has a good depth and is fairly broad at the waist, the epigastric angle measuring about 90 degrees or perhaps slightly less. In the well-turned thorax the lower ribs run but slightly downward from the horizontal, the spinal column in its upper part is quite straight, and the arms are set well back. Beginning at the lower lumbar region there is marked lordosis, which terminates at the buttocks or protrudes well beyond the general axis of the body. The thorax as a rule is placed forward of this general axis, the abdominal walls are flat or protrude but very slightly, the limbs are straight, the foot well arched, and the muscles are firm and covered with enough adipose tissue to round out the angles.

Contrasted with this in the exaggerated cases of enteroptosis the thorax is long, narrow, flat, and sunken (the so-called paralytic thorax); the lower ribs, instead of running nearly horizontal, slant sharply downward. The neck is often very long. The intercostal spaces are increased in the upper part of the thorax, but not below. The tenth rib is often

¹ Surgery, Gynecology, and Obstetrics, vol. iii, 1906.

floating and the waist or middle zone of the trunk is slightly increased in length. If the patient is standing, the abdomen is prominent, especially in its lower part. The epigastrium is flattened. The woman often has round shoulders and, instead of a well-marked lordosis in the lumbar region, the back is nearly straight and the buttocks are flattened. This last expresses a tilting of the pelvis forward so that its axis is much more vertical than usual. The muscles of the body are usually long and flabby, the patient has little adipose tissue, and the arch of the foot is often flattened, even though the woman is light in weight. The abdomen of the woman with enteroptosis is remarkable for the length of the waist and for its smallness; the epigastric angle is sharp and there is apt to be a decided flatness or a slight concaveness of the epigastrium. Under such circumstances it may be suspected at once that the right kidney is palpable and that under distention with gas the greater curvature of the stomach will be found at or below the umbilicus. It is of interest to note too that Harris believes the cause of floating kidney lies in a particular body form of which the chief characteristics are marked retractions of the lower end of the middle zone of the body cavity. Smith took careful measurements of 56 women in reference to enteroptosis, and although, as he says, these observations are too few to warrant elaborate conclusions, he found that a number of facts stood out clearly.

First, the long, narrow, shallow thorax, small waist and protuberant abdomen are usually accompanied by visceral ptosis, whereas the woman with a normal thorax, a large waist, and a flat abdomen has her abdominal organs in place. The sharpness of the epigastric angle usually corresponds to the narrowness of the waist, and the downward deflection of the ribs is in direct ratio to the flatness of the thorax. In a study of the mechanical conditions prevailing in enteroptosis there is a complex and difficult problem. First of all, the idea that the abdominal viscera hang upon or are supported by their ligaments or mesenteries must be got rid of. The truth is that these ligaments or mesenteries act simply as guy ropes, preventing excursions beyond certain limits. The abdomen is a hermetically sealed cavity, and owing to the fact that the visceral mass is capable of great change in form and position, many of the same laws govern it as would govern so much water in a like cavity. The upper part of the abdominal cavity is surrounded by the rigid thorax, half of which it occupies. In front are the firm abdominal walls, above is the diaphragm; within the pleural cavity there exists a so-called negative pressure, that is, atmospheric pressure minus the elastic pull of the lungs. This negative pressure tends constantly to draw the diaphragm upward. The weight of the abdominal viscera draws it downward. The balance of the weight is borne by the pelvis and anterior abdominal wall. The rigid upper abdomen must ever remain filled with the viscera. They cannot drop downward without producing a vacuum which under existing affairs is impossible. Under normal conditions

the upper abdomen contains the liver, kidneys, stomach, spleen, pancreas, and part of the intestines. Their weight pulls downward on the diaphragm, and inward on the rigid lateral walls. It is reasonable to suppose that when these walls are less firm than they should be they will collapse. In enteroptosis we have just such a condition. As a consequence the lower thorax draws inward, the diaphragm falls downward, and the epigastrium becomes flat or concave. If the abdominal walls below are flaccid they bulge and no longer bear their share of the weight. This tends to exaggerate the displacement.

So far the abdominal organs have been considered as a whole. Considering them individually, Smith says that the position of the liver is unique; lying as it does directly in contact with the diaphragm, it cannot become displaced downward without producing a vacuum. Held so closely to the diaphragm it takes but little part in the ptosis. In a few cases, however, it drops far enough forward on its ligaments to become palpable beneath the border of the ribs. So far as the kidneys are concerned, the right one drops readily and is more susceptible to ptosis than the left, the reason for which is not clear. The splenic flexure of the colon tends to remain more firmly fixed than the right. The intestines with their long attachments move downward and hang upon their mesenteries.

It has been thought that a large percentage of patients examined in reference to enteroptosis present some dropping of the stomach. Smith examined 100 patients and found the greater curvature of the stomach under distention to be as follows: in 52 cases below, in 22 at the level of, and in 26 above the umbilicus. The examinations were always made in the prone position. This method is open to error, for a distended colon or small intestine may be mistaken for the stomach. It is difficult to obtain findings in the standing position and patients in the prone position do not always give the full extent of the ptosis. In 9 cases Smith had *x*-ray pictures taken of the stomach following the exhibition of an ounce of bismuth given in a pint of milk, on an empty stomach. As soon after as possible, usually within an hour, several *x*-ray pictures were taken. From these observations Smith believes that the recent views of Holzkecht are as near the truth as any so far obtained. He found the normal stomach appeared of small size, did not show a hook-shape formation, and that the pylorus was placed at the lowest part. The picture of the normal stomach in one of Smith's plates shows the lower border well above the umbilicus and nearly on a level with the pylorus. The form of the stomach in which the long axis is vertical and in which the caudal portion of the greater curvature—lying higher or lower over the navel—occupies a lower level than the pylorus is regarded by him as abnormal. This lower part forms a hook, and on account of its frequency it has been regarded as normal.

An examination of the stomach contents of patients suffering from

enteroptosis did not show startling abnormalities. Observers on this point have come to different conclusions. In 12 of Smith's enteroptosis patients suffering from stomach symptoms there were 6 cases of hyper-acidity, 3 were normal, and 3 showed hypo-acidity. The peptic digestion was good in all excepting in 3, where it was slow; 2 of the cases showed considerable mucus, the others not more than the usual amount. Three or more examinations were made of each patient. It was noticed that the findings varied considerably at different times. From these observations the author concludes that the chemical changes are not constant.

It is quite natural to explain the stomach symptoms in enteroptosis cases by the deformity and the displacement of the organ. The obstruction caused by the kinking of the pylorus and the weakening of the motive powers through dilatation are sufficient to account for them. The truth of these suppositions is questionable, because in a considerable number of patients who have markedly elongated stomachs there are no stomach symptoms. In a patient whom Smith examined in reference to this point there did not seem to be any particular association between the amount of stomach displacement and the severity of the gastric symptoms.

What relation does this subject bear to gynecology? It may be practically left out of consideration so far as treatment goes in patients who suffer from neoplasms or from pelvic inflammatory diseases. It is, however, of great importance in considering perineal lacerations and the various displacements of the uterus, and that large class of patients presenting pelvic symptoms with slight or undemonstrable lesion. The question of operation in such cases must be considered with great care; the prognosis must be guarded. If operation is done, a postoperative course of treatment is necessary for good results. Enteroptosis and fair health are not incompatible. The enteroptosis may even be of decided degree and still the woman go through life comfortably and accomplish her work. As a rule, however, such patients do not bear the strains of life as well as more vigorous women. In speaking of preventive treatment, Smith emphasizes the importance of an outdoor life during childhood. For those already suffering from the condition it may be necessary to prescribe an abundant and easily digested diet and massage. The necessary conditions in regard to the bowels and digestion should be met. The patient should be kept in the open air, as is the habit in the treatment of tuberculous patients. Forced feeding is advisable. If Smith finds that relief is given by standing behind the patient when she is erect and placing the hands over the lower abdomen and lifting it up, he advises a well-fitting abdominal bandage. If the patient is young and the thorax is more or less mobile, he advises a system of breathing exercises with the idea of increasing the lung capacity and the size of the upper abdomen.

METRORRHAGIA MYOPATHICA.

In last year's *PROGRESSIVE MEDICINE* I reviewed a paper written by Anspach,¹ entitled "Metrorrhagia Myopathica." This name was proposed by him for those cases of intractable uterine hemorrhages which seem to be due to some alteration in the constituent parts of the myometrium. A number of articles have appeared during the past year which deal with the same problem; they have been written under the titles of chronic metritis and arteriosclerosis of the uterine blood-vessels. From a perusal of them it is at once evident that there is no uniformity of opinion as to the actual lesion which produces the chief symptom, viz., the metrorrhagia.

Donald² says that in the majority of cases of chronic metritis the disease is uterine from the first and there is never any acute stage. The trouble usually dates from confinement or miscarriage. The puerperal convalescence is fairly satisfactory, but if careful observation of the temperature and the pulse are made it will be found that there is a slight deviation from the normal. Whether this is due to the same organisms, in smaller dosage, which cause acute puerperal infection, or whether it is due to less noxious germs, is unknown. The symptoms appear after the patient begins to move about. She finds that she is easily tired and generally complains of pain or discomfort in the hypogastric, or in one or both iliac regions. There is usually leucorrhea in the early stages, and when the periods are reëstablished they are apt to be profuse or long continued. The lower part of the abdomen is sometimes distended. If the patient becomes pregnant again there is liability to miscarriage. Sometimes hemorrhage becomes a prominent symptom, and this is especially the case in women over forty years of age. This may be so serious as to affect the health or even to endanger life. The uterus is symmetrically enlarged and tender to pressure. The cervix is lacerated or hypertrophied, or it is thickened and hypertrophied without obvious laceration. There is either retroversion or exaggerated ante flexion. Donald distinguishes four clinical types: first, the uncomplicated type, principally dealt with in his paper, dating from confinement or abortion; second, the type complicated by inflammation of the appendages; third, the large uterus which bleeds profusely at the climacteric period; fourth, the uniformly enlarged virgin uterus in which the usual sources of infection can be excluded. One point which calls for careful investigation in cases of chronic metritis is the condition of the endometrium. At present we are rather in the dark as to the relative importance of the

¹ American Journal of Obstetrics, January, 1906, p. 1.

² Journal of Obstetrics and Gynecology of the British Empire, February, 1907, vol. xi, No. 2, p. 113.

changes in the endometrium and those in the mesometrium in the production of symptoms. This is especially so in the cases of profuse intractable hemorrhage. The theory which assumes that the muscular tissue of the uterus is replaced by a fibrous tissue and that the hemorrhage is due to want of muscular control is an attractive hypothesis, but it has yet to be proved.

Shaw¹ gives the result of a microscopic examination of 38 uteri extirpated for chronic metritis, and compares it with the result in 23 normal uteri from patients of various ages. He also took sections from the endometrium in 50 cases of endometritis. The latter cases were employed chiefly for the purpose of comparing their clinical histories with those of the cases of chronic metritis.

In regard to the vascular changes in chronic metritis, he found the vessels unaltered in 15, a few enlarged but walls not thickened in 2, vessels decreased in number in 6, vessels increased in number in 4, a few vessels with thick tunica media containing fibrous tissue in 6, a few vessels undergoing hyaline or colloid degeneration in 4, and a combination of the last two in 1. In 21, that is 55 per cent., the vessels were not increased in number nor were there any changes observed in the vessel walls, but in the course of these 21 cases hemorrhage was of quite as frequent occurrence as in the other 17. In 6 instances some of the larger arteries showed a great increase in the thickness of the tunica media—the result of fibroid deposit. This condition Reinecke, Findley, and others believe to be the basis for the excessive hemorrhage in chronic metritis. Shaw cannot confirm their belief because he found arterial fibrosis in but 6 specimens out of the 38 which were examined, and of these 6 cases 3 had had no excessive hemorrhage; furthermore he found such a fibrosis in the vessels of many multiparous normal uteri.

Concerning the relative amounts of connective and muscular tissue in chronic metritis, Shaw found that the great increase in the thickness of the uterine wall could not be explained on the grounds of a disproportionate increase of the fibrous tissue. His chronic metritic uteri showed on an average an increase of only 0.8 of 1 per cent. of connective tissue above the normal uterus. But their walls averaged an increase in thickness of more than 100 per cent. To say that such an increase in bulk is due entirely to a hyperplasia of the connective tissue at the expense of the musculature would be obviously incorrect. What has really taken place, says Shaw, is a hypertrophy of the entire uterine wall, the connective tissue having increased in some specimens in rather greater proportion than the muscular tissue. In regard to the thickness of the mucous membrane, Shaw found that in 35 cases 33 showed endometrial changes.

¹ *Journal of Obstetrics and Gynecology of the British Empire*, February, 1907, p. 124.

He says that the glands were smaller than normal in 4, enlarged in 5, increased in number in 10, enlarged and increased in number in 10; the stroma was increased in 3; the glands were enlarged and the stroma was increased in 3. These endometrial alterations, along with the hypertrophy of the mesometrium already noted, he found to be the only constant lesions of chronic metritis.

For the sake of comparing chronic metritis with chronic endometritis, the author tabulates the results after curettage in 50 cases diagnosticated as chronic endometritis. The patients in both classes complain of abnormal menstruation, intermenstrual pain, and discharge and dysmenorrhea. In both the uterus is increased in size and is tender. The symptoms usually occur in varying proportions in the two diseases, but generally the difference is too slight to enable a definite diagnosis to be made. Practically a patient may be said to be suffering from chronic endometritis when her symptoms are recent and when her uterus is not very much enlarged; whereas, if the symptoms have been of longer duration, and the uterus is much enlarged and hard, and if hemorrhage is the chief symptom, and especially if the patient has been curetted without relief, a diagnosis of chronic metritis is justified. Chronic endometritis thus appears to be a precursor of chronic endometritis.

That the symptoms in Shaw's endometritis cases were due to a diseased endometrium is proved by the excellent results of curetting, 39, or 78 per cent., of his 50 patients reporting at the end of six months that they were improved, and only 11, or 22 per cent., that they did not feel any better. When the endometrium is hypertrophied the probability is that the uterus will endeavor to expel it just as it does all foreign bodies. This would especially occur during menstruation, when the mucous membrane becomes more swollen, and would account for the severe pain which most of these patients complain of at that time. Any muscular body with increased work in the course of time hypertrophies. It is easy to imagine an endometritis being set up after confinement or miscarriage through either a slight degree of sepsis or through the retention of a small piece of membrane or placenta. This is sufficient to explain the symptoms of amenorrhea, metrorrhagia, and leucorrhea. The dysmenorrhea is explained by the contraction of the uterus, made in an effort to expel the swollen endometrium. In the course of time the contractions lead to hypertrophy of the uterus, and so account for the large, hard uteri. The constant aching pain found in these chronic metritic patients is due to the enlarged heavy uterus dragging upon the broad ligaments. That the endometrium is primarily at fault is proved by the results of curetting.

Donald suggests in his paper that the word "metritis" may be a misnomer for some of the cases grouped under this title. Shaw's paper is a most admirable one, and yet his conclusions of the relation between endometritis and metritis are not convincing.

Elizabeth Macdonald¹ has written an excellent paper, and has very broadly outlined the causes of the uterine hemorrhage of the type in question. She says that the connection between uterine arteriosclerosis on the one hand and uncontrollable uterine hemorrhage on the other has not been clearly established. Cases are known where a marked sclerotic condition of the vessels has been unattended by hemorrhage, and the occurrence of serious hemorrhage has been noted where the vessels showed no change.

A consideration of the mode of occurrence and control, so far as we know it, of the normal menstrual hemorrhage, may throw some light on the causation of abnormal uterine hemorrhages. It is clear that the normal hemorrhage is brought about and controlled by several factors, and that a disturbance in any one of these may cause irregularities:

1. Abnormalities in the periodic ovarian stimulation.
2. Conditions giving rise to muscular insufficiency, either from (a) actual deficiency of muscular tissue or (b) loss of tone, and consequent deficient response to vasomotor stimulation.
3. Conditions giving rise primarily to continued congestion of the endometrium, either from (a) increased arterial supply or (b) venous obstruction.

Of ovarian changes and their effect on menstruation we know comparatively little. We know from actual experiment that the growth of the uterus depends directly on the healthy functional activity of the ovaries, that the complete removal of the latter results in atrophy of the uterus and of the genital organs generally, and that the retention of even a small piece of healthy ovarian tissue is sufficient to prevent these regressive changes. Physiologically there is a gradual lessening of ovarian activity as the menopause is approached, and this is accompanied by these general regressive changes, atrophy of the uterine muscle and mucosa, thickening of the walls of the vessels with narrowing of their lumina, and the gradual cessation of menstruation.

Menorrhagia in connection with ovarian disease, especially early cystic changes in the ovary, is well known to occur, and was noted many years ago by Lawson Tait.

Since the menstrual stimulus is associated essentially with an increased blood pressure, producing its effect in the uterus by creating a sudden hyperemia, it seems reasonable to suppose that an exaggerated stimulus should result in menorrhagia.

The probability of disturbed ovarian function occurring at the menopause is readily appreciated, and the marked connection between the approaching menopause and uncontrollable uterine hemorrhage strongly suggests the possibility of ovarian changes being a causal factor in the

¹ Journal of Obstetrics and Gynecology of the British Empire, February, 1907, p. 152.

hemorrhages. Cases of spontaneous cure occurring when ovarian activity ceases and the menopause is fully established, strengthen this possibility.

Further, it is evident that impairment of the functional activity of the ovaries may occur independently of any demonstrable lesion, and may be the cause of hemorrhage in those cases where no pathological condition is found.

It is obvious, from a consideration of the part played by the musculature in the control of menstrual hemorrhage, that failure of the muscle to contract efficiently may be associated with hemorrhage of the severest kind. Such failure may be due to (a) actual deficiency of muscular tissue and (b) loss of tone in the musculature.

Cases of hemorrhage where the musculature is insufficiently developed, or when its atrophy is definitely premature, are undoubtedly to be placed in the category of myopathic hemorrhages. In this class also may justly be placed those cases which have as their starting point an acute febrile disease such as typhoid; or are associated with anemic conditions, particularly chlorosis, or with chronic wasting diseases, such as phthisis. All these are definitely associated with changes in involuntary muscle and show their effects as a rule on the heart. Otherwise, changes in the uterine musculature are probably for the most part secondary to circulatory disturbances.

Continued congestion of the endometrium may be due to (a) an increased arterial supply.

The endometrium may be primarily at fault, as in cases of direct infection, placental retention where the remnants act the part of an irritant foreign body, and malignant disease of the mucosa. Inflammation and tumors of the adnexa, as also tumor formation, particularly fibromyoma, in the uterus itself, will likewise determine an increased arterial supply, and to these may be added any local irritation, mechanical or psychical.

(b) Venous obstruction may arise from a general condition, such as heart or kidney disease, chronic affections, chronic constipation, etc.; or from local obstructions to the venous return, such as would be caused by tumors within or without the uterus; or from displacements of the uterus.

We do not know how ovarian activity acts in maintaining the uterus in a healthy condition, but a twofold action at least suggests itself. The periodic vasomotor stimulation causing reflex contraction maintains the musculature in an efficient working condition, and ovarian secretion in some obscure way preserves a healthy uterine tone. When ovarian stimulation begins to fail, the uterus suffers in this twofold way, so that there is a certain amount of atrophy from disuse, and a tendency to degeneration from the cutting off of some trophic influence. These effects will be equally produced in a uterus already affected by hyperplasia from continued congestion, and they are sufficient to determine

the disturbance of compensation which results in menorrhagia. The menstrual stimulation is essential in starting the hemorrhage; the prevailing uterine conditions prevent its normal arrest.

If we consider how the physiological changes are brought about, the question becomes clearer. Westphalen and Thoma have endeavored to show that the peculiar vessel changes in the uterus are essentially due to the changes in blood pressure to which the functionally active uterus is subject. The periodic increase in blood pressure at the menstrual periods, and still more the pressure changes incident to pregnancy and the puerperium, cause changes in the uterine vessels to which no other vessels in the body are subject to the same extent. The uterine vessels are, so to speak, shorter-lived than any others. If now it be supposed that changes in blood pressure in these arteries arise from some pathological condition, apart from pregnancy, etc., similar changes will presumably occur.

Theoretically, we may suppose that persistent high tension in the uterine and ovarian arteries will bring about as a first result, through increased vasomotor stimulation, an exaggerated response on the part of the musculature, so that a true "work hypertrophy" takes place, *i. e.*, hypertrophy of the uterine muscle generally, including the muscular coats of the arteries. Since arteries acquire their coats in proportion to the pressure they are called on to resist, it is probable that the adventitia will be strengthened by an increase in fibrous tissue. The strain must necessarily tell on the intima. In all parous uteri the inner elastic lamina of the arteries is thickened. In the case described, where general arteriosclerosis was present, the larger arteries show a marked increase in elastic tissue in the intimal coats. Probably this is the nature of the compensatory change when the artery wall is subjected to a sustained increase in blood pressure. Later the continued pressure will bring about degenerative changes; in the intima, whose nuclei disappear to a great extent; and in the media, where fatty degeneration and atrophy of the muscle may occur. We may further suppose that if the increase in pressure be gradual and sustained, as would occur in a case associated with general arteriosclerosis, the compensatory change will extend gradually to smaller and smaller branches of the vessels, reaching eventually the endometrial capillaries. When degenerative changes have occurred, and the vessels can no longer react to the increased blood pressure, in other words, when compensation is disturbed, hemorrhage will result. The importance of menstruation in starting the hemorrhage has already been seen.

Gardner and Goodall¹ repeat the concise definition of chronic metritis or fibrosis uteri as given by Bland Sutton before the British Medical Association in 1904. He writes: "Under the term I described is a

¹ British Medical Journal, November 3, 1906, p. 1177.

peculiar affection of the uterus, of which the leading clinical feature is uncontrollable menorrhagia. The regular abundant loss of blood is not merely uncontrollable from the point of view of drugs and rest, but also is irresistible to curetting, and in some of the cases which have been under my care the uterus had been repeatedly curetted by competent men." The disease, which is chiefly met with in women between thirty-five and forty-five years of age, is associated with striking structural changes in the uterus. The organ is larger than usual and its walls thick and tough. On microscopic examination the muscle tissue of the uterus is seen to be replaced by an abnormal growth of fibrous tissue. The walls of the uterine arteries are thick and the lumina of the vessels narrowed and occasionally obliterated. Clinically, the authors say, we recognize simple and complicated chronic metritis. With the former we shall concern ourselves chiefly, but refer to the latter to leave no room for ambiguity. By simple metritis we mean a simple entity in which the uterus is enlarged, hardened, symmetrical, where curetting has no appreciable effect, and where the uterine appendages are free of any organic disturbances to which the metritis might be secondary. By complicated metritis we mean a disease characterized, upon physical examination, by the same signs as given for simple metritis, but associated with grave involvement of the appendages and other pelvic organs. In short, in simple metritis the uterus alone is found to have undergone changes recognizable clinically, whereas in complicated metritis the other genitalia are always involved. Of the 9 cases which Gardner and Goodall described fully, 6 presented none of the clinical features of arteriosclerosis, whereas the other 3 showed various stages of general arterial degeneration. They have endeavored, they say, to compare these two series throughout. They conclude: Pathologically, cases of simple metritis divide themselves into two distinct groups:

1. (a) Those which arise from infection, subinvolution, or from one of many other causes. These show a degeneration more of the nature of an inflammatory deposit or a deposit of passive congestion, which deposit is characterized by being hyaline, frequently fragmented, poor in nuclei, and frequently affecting both muscle and fibrous tissue, but chiefly the latter. The deposit is most marked where the tissue is of loose texture. In these cases the adventitia is most affected and the media moderately, but it is very seldom that changes are found in the intima. (b) Those of true arteriosclerotic origin characterized by true fibrosis of the arterial wall and artery, sclerotic changes in the vessels, all three coats of which are usually involved.

2. Cases of arteriosclerotic origin are not due to infection, and those of the other group may or may not be due to infection, depending upon the cause.

3. Subinvolution from whatever cause is the most frequent source of chronic endometritis.

4. In all cases of chronic metritis not arising from arteriosclerosis there is hypertrophy in the muscle wall of the non-contractile element, and the muscle hypertrophy is either due to incomplete involution or it is the result of congestion.

5. In cases of arteriosclerotic origin there may or may not be muscular hypertrophy associated with fibrosis. This will depend upon associated conditions.

6. Changes in the endometrium in the nature of endometritis will be found in cases of Group *a* of septic origin, but in Group *b* the cause is ordinarily arterial, and endometritis may be secondary, but cannot be primary excepting by association of two diseases.

7. The hemorrhages are not due to endometritic changes, but endometrial involvement may accentuate the flow.

8. The menorrhagia and metrorrhagia are due in some cases to muscular insufficiency not only to uterine muscle, but to the muscle of the arteries also.

9. The muscular insufficiency is due to the restraining influence of the increased non-contractile tissue.

10. Hemorrhage in arteriosclerotic uteri is due to pelvic congestion and high arterial tension, with lack of contractility of the vessels in response to vasomotor stimuli combined with muscular atrophy of the uterine wall.

11. The lumina of the vessels do not suffer to any great extent from proliferation of the intima and the change is one of compensation.

12. Many vessels must be examined in serial section in order to appreciate how much they are involved.

13. The general changes throughout the uterine wall in cases of fibroid or fibromyomas of the uterus are similar to those in Group *a* and the hemorrhages arise from the same causes which fall under Group *a*.

MENSTRUATION.

So important a function as menstruation is a subject always worthy of attention. Its alterations may be indicative of many diseases widely different in their nature and in the parts affected. These deviations can be appreciated best by comparing them with the normal menstrual habit of the individual. It is well known that what would be an entirely normal period in one woman would be strongly suggestive of some lesion in another. So that in estimating the significance of atypical menstruation one must be guided by the type of period common to the individual patient. During the past year a number of interesting articles have been written.

Puberty, Duration of Menstrual Life, and the Menopause. Schaeffer¹ found, in a study of 10,500 cases in his polyclinic at Berlin, that men-

¹ Monatschrift f. Geburtsh. u. Gynäk., Heft ii, S. 169.

struation began at an average of fifteen and three-fourths years; 5.7 per cent. menstruated first between the ages of nine and twelve years, inclusive; 85.1 per cent. menstruated between thirteen and eighteen years, inclusive; 52 per cent. during the fourteenth, fifteenth, and sixteenth year; 4.09 per cent. menstruated after the nineteenth year.

The duration of menstrual life was ascertained in 626 cases; it averaged about thirty and three-fourths years. In 54 cases first menstruating during the eleventh, twelfth, and thirteenth years, the menstrual life lasted for thirty-five and one-half years. In 362 cases first menstruating from the fourteenth to the seventeenth year, inclusive, the average duration of the menstrual epoch was thirty-one and one-half years. In 210 cases first menstruating after the eighteenth year, the average duration of menstruation was twenty-eight and one-third years.

In order to decide whether the shorter duration of the menstrual life in those who begin to menstruate late is the natural result of late puberty with a more or less fixed menopause, the author tabulates 626 cases. In 54 menstruating before the age of fourteen, the menopause occurred at the average age of 48.17 years. In 362 menstruating from the fourteenth to the seventeenth years, inclusive, the periods ceased on the average at 47.11 years. In 210 cases menstruating first at the age of eighteen years or later, the time of the menopause averaged 47.51 years. It appears from this at first sight that those who menstruate early have a late menopause, and that those who menstruate late have a later menopause than those who reach puberty at the average age. These results, he believes, are due to a paucity of the statistics and he does not subscribe to the widely held view that those who menstruate early in life have a late menopause, and that those who become pubescent late have an early menopause. It is evident, however, that, given a more or less constant age for the menopause, those who reach puberty early will have a longer menstrual life than those whose menstrual periods begin late.

Influence of the Menstrual Period on the Body in General. Tobler¹ has made observations on 1020 women with regard to the influence of the menstrual period on the entire economy. She sought to answer the question: What proportion of women suffer from local or general disturbances at the menstrual period, what sort of disturbances are they, and how do they react on the physical and psychical capacity? She found:

¹ Monatschrift f. Geburtsh. u. Gynäk., Heft. i, S. 1.

		Per cent.
No pain	in 161 cases	in 15.8
Local pain only	45	" 4.4
Physical disturbance without local pain	70	" 6.9
Physical disturbance with local pain	149	" 14.0
Psychical disturbance without local pain	80	" 7.8
Psychical pain with local pain	57	" 5.6
Physical and psychical disturbance without local pain	117	" 11.5
Physical and psychical disturbance with local pain	270	" 26.5
Absolute improvement in general condition and physical and mental capacity	34	" 3.3
Partial improvement in general condition and physical and mental capacity	37	" 3.6

She attributed these menstrual disturbances to improper modes of life. The increased products of metabolism which are formed through a periodic irritation of the genital system, instead of being uniformly useful to the body, have a toxic action.

Relation of Hysteria, Heart Disease, and Chlorosis to the Beginning and the Type of Menstruation. Diepgen and Roux¹ studied a series of 75 cases of hysteria, 116 cases of heart disease, and 141 cases of chlorosis in their relation to the menstrual process. They found that in women who later developed hysteria the onset of menstruation was later than normal; this they regard as an evidence of physical ill development predisposing to hysteria. Hysteria itself exercised little influence on the amount and the frequency of menstruation once established, but was a very frequent source of dysmenorrhea. The 116 cases of heart disease comprised chiefly valvular disease, less often chronic myocardial and precordial disease. Fever cases were excluded. They found that heart disease acquired early in life frequently retarded the onset of menstruation. In heart cases the menses are usually diminished and not increased in amount, as has been asserted by Lebert. Even in high-grade disturbances of the heart developed after puberty, there was alteration of the menstrual habit in but 13 per cent., and this was more often in the direction of a diminution than of an increase in the menstrual flow. In 3.5 per cent. of the cases there was dysmenorrhea. He thinks the menstrual disturbances associated with heart disease are due much more to general bodily weakness, the result of heart disease, than to a circulatory disturbance.

In chlorotic girls menstruation begins late, as in hysteria. This contradicts Stephenson's and Gebhard's observations. When the periods are established normally in chlorotic girls, they are influenced in but a small proportion of cases, viz., delayed in 8.5 per cent.; increased in frequency in 12.1 per cent.; become painful in 12.1 per cent. The authors conclude that the menstrual anomalies in chlorosis are not due to the disease *per se*, but that both the menstrual and the chlorotic

¹ Zeitschrift f. klin. Medizin, lix, Nr. 2-4, S. 154.

symptoms are due to a third cause, a defect in development in the sense of Hegar.

Phenomena Associated with Menstruation which May be Indicative of Disease. Franck¹ believes that a rise of temperature during the menstrual period may be a very early symptom of tuberculosis. He thinks that a rectal temperature above 99.5° at this time may be considered as pyrexia, and in the absence of a local condition in the pelvic organs he would suspect tuberculosis.

Riebold² after extensive observations considers that in many individuals, shortly before the onset of menstrual bleeding, there occurs an increase of all the vital activities. In unhealthy women there is an especial tendency to new infection at this time. Any disease may be badly influenced. An increase of temperature may be due to absorption from an old focus of infection or to the exacerbation of an already established illness. Premenstrual fever is observed frequently, but not exclusively in phthisical women; it is never observed in entirely healthy women.

Riebold thinks the erythema, urticaria, herpes zoster, and neuralgias occurring during menstruation are due to the action of toxins. He has also observed a rheumatic affection of the joints and heart, which he thinks is closely associated with infection or intoxication from the menstruating genitalia.

How Soon After Abortion Do the Menstrual Periods Recur? Englander³ investigated 57 cases of abortion occurring during the first four months of pregnancy. In 36 cases menstruation recurred after four weeks; in 8 cases during the fifth week; in 6 cases after five weeks; in 2 cases during the sixth week, and in 4 cases after six weeks; in a single case after three weeks. He draws attention to the reappearance of the menstrual flow at the end of four weeks and insists that it should be recognized as such and not as an indication of retained secundines demanding curettement. If the bleeding at the time of abortion has stopped entirely after a few days, the return of a flow in four weeks may be regarded as entirely normal. If irregular bleedings persist, the curette and placenta forceps are in order.

Pathological Changes Resulting from the Artificial Menopause. Pollock⁴ made observation on eight castrated animals. He concluded from them that the symptoms of the artificial menopause are due, in part at least, to a temporary deposit of unoxidized fat in the parenchymatous organs and in the heart. This failure of oxidation results from abrogation of the ovarian secretion. Such a condition of the heart teaches us the practical importance of not overtaxing it in the first months after castration.

¹ Berliner klin. Wochenschrift, xlii, Nr. 42, S. 1344.

² Deutsche med. Wochenschrift, xxxii, Nr. 29, S. 1161; Nrs. 11 und 12, S. 461.

³ Centralblatt f. Gynäk., xxx, Nr. 7, S. 211.

⁴ Monatschrift f. Geburtsh. u. Gynäk., Heft iii, S. 327.

Amenorrhea and Brain Tumor. Under this title an editorial¹ remarks that during the last decade a suspicion has developed that various intracranial growths produce disturbances of menstruation, especially in the direction of scantiness or even complete absence. In 1903 Axenfeld pointed out that tumors of the base of the brain, especially those which involve the hypophysis cerebri, were most commonly productive of cessation of menstruation. For some years it had been recognized that acromegaly, especially in young persons, was likely to have complete amenorrhea as one of its first symptoms. Cessation of menstruation often declared itself many months before any other symptoms of acromegaly could be observed and usually was treated in many ways before the hopelessness of the condition was realized, with the inevitable advance of the nervous and tissue manifestations. In these cases the relationship between optic atrophy and the disturbance of menstruation was an early symptom and optic atrophy was also likely to develop early. The two sets of symptoms indeed were noted as tending to run corresponding courses. These observations have been confirmed in every part of the world and further study of such cases has thrown light upon certain hitherto puzzling gynecological conditions.

Harvey Cushing of Johns Hopkins University, calls attention to cases in which tumors of the hypophysis cerebri were complicated not only by optic atrophy but also by sexual infantilism, this latter involving complete absence of menstruation. Such cases have been reported delayed. Menstruation has only been imperfectly established and then has not infrequently disappeared completely after a short time. There would seem to be a very definite relation between the hypophysis and the genital organs, for before the sexual development has been very much advanced a certain number of instances of failure of male genitals to develop normally have been reported in cases in which tumors of the hypophysis were diagnosed, and which were actually demonstrated at autopsy. While most observers seem inclined to the opinion that it is the hypophysis and its functional disturbance which are directly responsible for the interference with menstruation, there is no doubt that in a number of reported cases the brain tumors have been situated a considerable distance from the hypophyseal region, some of them indeed at the periphery of the brain. In these cases it has been argued by those who favor the hypophysis theory that either the function of the gland is interfered with by the occurrence of internal hydrocephalus with distention of the Recessus infundibuli, or else that the gland suffers in some other way from the increased intracranial pressure. There is, however, no absolute demonstration of this, and in some cases the whole disturbance of the central nervous system seems to have been the main cause for the menstrual difficulty. In a certain number of cases it has

¹ *Journal American Medical Association*, vol. xlvii, No. 26, p. 2162.

been noted that injuries in which concussion of the brain takes place are followed by prolonged disturbance of menstruation, especially cessation for many months, and it would seem to closely connect the underlying pathology directly with the hypophysis.

The lesson of this recent observation is plain. A distinguished professor of gynecology of the last generation used to tell his pupils that they must not forget a woman has a large number of organs outside of her pelvis. Most of these reported cases of disturbance of menstruation have been treated by local measures, of course without results. As a large proportion of the cases were young and unmarried the desirability of avoiding such a mistake is manifest.

The Significance of Dysmenorrhea at Puberty. Reese¹ believes that dysmenorrhea at puberty is often a symptom of fibroids which are then very small and clinically unrecognizable, but which subsequently develop. He further asks: Is it not safe to conclude that a lesion which produces dysmenorrhea at puberty may, if not removed, act as an exciting cause of uterine fibroids?

NON-OPERATIVE PLANS OF TREATMENT OF GYNECOLOGICAL DISEASES.

Pelvic Massage. Taber Johnson² believes that there may be much good in pelvic massage, when properly used in properly diagnosed cases. Quite a bright future may yet open up for its expert use in the debatable and yet unconquerable field of uterine displacements; but like all other good things, it is liable to abuse by the inexperienced or the commercially dishonest practitioner.

Norstrom³ outlines his treatment of diseases of women by means of pelvic massage. Most of his article is taken up by a history of this plan of treatment of pelvic disorders. He describes chiefly the massage which is indicated in cases of retroposition associated with adhesions. He claims excellent results, but makes no positive statements, and condemns women as masseuses. I am inclined to think that the movements described are no more than the usual manipulations required to replace the uterus in difficult cases. In another article he recommends massage in the treatment of dysmenorrhea due to chronic metritis. He also uses it in the treatment of parametritis and perimetritis and to control the hemorrhage in cases of fibroid tumor.

Treatment of Idiopathic Dysmenorrhea. Jacoby⁴ asserts that *styptol*, the neutral phthalate of cotarnine, is very efficacious in idiopathic

¹ Medical Record, December 23, 1906, p. 1017.

² Virginia Semi-Monthly, January 26, 1906, p. 467.

³ New York Medical Journal, December 23, 1906, p. 1312.

⁴ Medical Examiner and Practitioner (N. Y.), August, 1906, p. 246.

dysmenorrhea. A distinction, he says, must be made between dysmenorrhea as a symptom and dysmenorrhea as an idiopathic disease. Styptol not only acts as a sedative in the latter condition, but also as a rule brings about a permanent cure. Owing to its double sedative and hemostatic properties, the drug must be regarded as a safe remedy in painful and prolonged menstruation. The quieting effect is hardly ever absent if a sufficiently large dose is ordered. The proper daily dose is two 0.05 gram tablets four or five times. Toxic symptoms as a result of treatment with styptol have not yet been observed. In dysmenorrhea it is best to give the drug several days before the appearance of menstruation. If chlorosis is present, iron and a milk cure are indicated in the intervals.

THE STEM PESSARY IN AMENORRHEA, DYSMENORRHEA, AND STERILITY. Carstens¹ says of the stem pessary:

1. The stem pessary will generally cure amenorrhea after all other measures have failed.
2. It will develop an infantile uterus, enlarge a prematurely atrophied one, and restore a superinvolted womb to a normal condition.
3. It will cure most cases of intractable dysmenorrhea, when no special pathological condition can be found.
4. If worn for six months or a year it sometimes cures sterility.
5. All inflammatory conditions about the pelvic organs must be rigidly excluded before it is used. The same aseptic precautions should be taken during its introduction that a surgeon would take with the most complicated case of abdominal surgery.

It is usually necessary to give an anesthetic when the pessary is introduced, as the cervix must be dilated. The patients are kept in bed several days and are then allowed to get up. If the stem is put in alone it is often forced out, so that it is a good plan to combine with it a Hodge-Thomas pessary to keep the uterus forward. If there is a discharge douches are used, but ordinarily none are employed. The stem is left in from three to four months, or from six months to a year. It causes absolutely no pain or distress, and women do not know they are wearing it unless they are told.

The Passive Congestion Treatment of Bier in Gynecological Conditions. A novel plan of treatment suggested by Bier has received a great deal of attention in gynecological circles. Although first employed by its author in affections of the extremities where the passive congestion was easily produced, a number of men have contrived apparatus by which a more or less analogous effect on the genital organs may be produced. Like every new plan it has its enthusiastic advocates. Turan² has devised a special instrument for the employment of Bier's method in the treatment

¹ Journal American Medical Association, vol. xlvii, No. 26, p. 2133.

² Zentralblatt f. Gynäk., xxx, Nr. 12, S. 356.

of chronic endometritis. He claims to have had excellent results in 4 cases occurring in sterile women. Suction was applied to the interior of the uterus every second day. The *seances* lasted for from five to twenty minutes; the number of treatments was twenty. The results were excellent. It must be remarked, however, that the patients at the same time were taking mud baths and prolonged vaginal douches.

Kroemer¹ has devised a form of glass speculum for the purpose of using Bier's congestive hyperemia. He thinks it deserves a trial in acute infectious processes in the genital canal for the localization of infectious foci; residua of inflammatory processes, either by producing an active or passive hyperemia, and thus the softening of structures and scars and the absorption of infiltrates, or by relieving passive hyperemia when used in conjunction with scarification.

Eversmann² has employed suction applied to the cervix of the uterus in the treatment of endometritis associated with serious leucorrhea. Suction was applied for one-half hour at a time at intervals of several days, gradually decreasing the intervals until it was applied every day. The suction was used steadily for five minutes, then released for a minute, and then applied again. He has had much success.

Bauer³ has tried the suction treatment in erosions of the cervix, catarrh of the cervix, endometritis, metritis, and amenorrhea. In erosion it proved of no avail; in chronic metritis he had good results. In cervical catarrh and in endometritis associated with profuse discharge, much immediate good was observed in a cessation of the flow, but the symptoms soon returned unless the treatment was kept up, so that a cure could not be claimed. It seems, however, that the removal of the thick, tenacious mucus is a valuable preparatory adjuvant in the application of caustics or antiseptics to the endometrium or the cervix.

The Use of Heat in the Treatment of Pelvic Inflammatory Diseases. The use of heat in various forms as a therapeutic measure for pelvic inflammatory diseases has been demonstrated time and again. Hot vaginal douches and hot fomentations to the lower abdomen are very generally used. The employment of hot air is not so common. Several years ago I noted the use of this method. Recently Jung⁴ reports his results in a large series of cases. He says that at the Greifswald clinic the following principles are applied in the treatment of pelvic inflammatory diseases:

1. Chronic, non-suppurative diseases of the adnexa with adhesions of the uterus and adnexa are treated conservatively, and are operated on only after conservatism has failed, or when the local condition of the patient prevents the use of conservatism.

¹ Zentralblatt f. Gynäk., xxx, Nr. 4, S. 112.

² Ibid., xxix, Nr. 48, S. 1467.

³ Wien. klin. Wochenschr., xviii, Nr. 47, S. 1242.

⁴ Münchener med. Wochenschrift, lii, Nr. 52, S. 252.

2. Chronic non-suppurative parametritis (cicatrical formations in the pelvic connective tissue) as a result of old, healed exudates, chiefly of puerperal origin, are uniformly treated by conservative measures.

3. Suppurative adnexal tumors (pyosalpinx, peritoneal abscesses) are incised by way of the vagina and then treated conservatively.

4. Suppurative parametritic processes are exposed to abdominal or vaginal incision, according to the situation of the pus, and after evacuation treated by conservative means.

In 120 cases, comprising all of the above groups—viz., palpable exudate in connective-tissue or inflammatory adnexal tumors, often both combined (no incision), 65; exudate or inflammatory adnexal tumor with clinically recognizable abscess (incision), 52; tuberculous adnexal disease, 3—there were 25 results which were negative or doubtful; in 13 an operation was required later. Of the others, in 88 there was a subjective and an objective good result.

The apparatus used was similar to that of Polano described several years ago in *PROGRESSIVE MEDICINE*.

GYNECOLOGICAL OPERATIONS.

The Transverse Suprapubic Oeliotomy Incision. Taylor¹ has used the transverse incision in about 100 laparotomies. The advantages of Pfannenstiel's plan are principally the avoidance of a conspicuous scar and the diminished chance of hernia. The scar in a vertical incision, he says, in many cases becomes either a broad and flat or a thick keloid. The scar following a transverse incision usually remains as a thin line, even after some years. A hernia may occur theoretically after the Pfannenstiel operation, but in 2 such cases of which the author knows, there was infection of the wound, with more or less destruction of the fascia. The disadvantages of the incision are the longer time that is required to enter the abdomen, the limited space through which to work, and the difficulty of increasing this space if necessity demands. It requires from two to four minutes longer to make this incision than the median one, but it takes no longer to close it.

The technique of the incision is not difficult. The incision should be made either just below the margin of the pubic hair or in the crease above it which is found in stout women. The incision should be straight or else slightly curved, with the concavity toward the umbilicus. Care has to be taken that the incision is symmetrical: that is, that it is not longer on one side of the median line than on the other, and that one end is not higher than the other. The incision is carried directly down to the fascia at a higher level than the incision through the skin. The incision through the fascia is transverse with the ends curved upward, if

¹ Surgery, Gynecology, and Obstetrics, May, 1906, p. 538.

necessary, at the outer edges of the recti muscles. The upper flap, composed of skin, fat, and aponeurosis, is dissected from the recti muscles. It is wrong to dissect the fat from a broad surface of the aponeurosis, as it interferes unduly with the blood supply.

To separate the aponeurosis from the muscles the scissors are necessary in the middle line; elsewhere it is easily separated with the finger. The separation is carried highest in the middle line; at the end of the incision only a little separation is made. The recti muscles are separated and the peritoneum opened in the middle line as with the vertical incision. If more room is required the incision may be changed to a vertical one, which would make the shape of the incision that of an anchor. A better plan, the author thinks, is to extend the ends of the incision upward to the necessary extent along the outer border of the recti muscles. This avoids a weak point at the junction of two incisions. In none of his own cases has it been necessary to extend the incision in this way. He uses the incision in cases that within a reasonable doubt will require a vertical separation of the recti of not more than four inches in a thin woman, and not more than two inches in a fat woman. In very large women he would not use the plan at all. The incision should not be used for inflammatory cases.

The appendix was removed in 65 of the cases. Usually there is no difficulty in appendectomy unless the appendix is situated high up behind the colon. Although I have very rarely used a transverse incision in celiotomy operations, the favorable report of Taylor will lead me to try it in some of the simpler cases. From my own experience I should employ such an incision for one reason only and that is the avoidance of an unsightly scar. There is little or no danger of postoperative hernia, when the usual median incision is used, if the wound is sutured carefully and the rectus fascia is overlapped.

Closure of the Abdominal Incision. Noble¹ writes that it is now generally conceded that the chief strength of the abdominal wall as a supporting structure depends upon the aponeurosis. It is also equally believed that the chief cause of postoperative ventral hernia is due to defective union of the aponeurosis. In 1896 Noble devised a method of suture whereby the aponeuroses were not brought together simply along their divided edges, but one fold was slipped over and sutured to the opposite fold of aponeurosis, thus securing a broad and accurate union.

The incision in celiotomy operations he says is preferably made through the inner border of the right rectus muscle.

In closing the wound the peritoneum is first sutured with a continuous suture of fine cumol catgut. The fat is then dissected from the upper surface of the aponeurosis of the transverse muscles on the left side of the wound from one-third to one-half inch. The aponeurosis upon the right side of the wound is then separated for an equal distance from the

¹ *Annals of Surgery*, March, 1906, p. 349.

rectus muscle. The muscles and fascia are then sutured by means of a medium-weight chromicized catgut suture in the following manner: Suturing is begun upon the lower angle of the wound upon the left side. The suture is passed from above downward from the aponeurosis to the rectus muscle. Then the separated bundles of the rectus muscles are united with the continuous suture until the upper angle of the wound is reached, when the suture is passed from below upward through the aponeurosis to the left side of the wound. The suture is then passed from below upward through the aponeurosis on the right side of the wound and an additional suture is taken above this point to fix the suture and take the strain off that part which has brought the muscle in apposition. The aponeurosis is then closed from above downward by catching the aponeurosis over the left side of the wound after the manner of a Lembert introducing suture, and then passing the needle from below upward through the aponeurosis on the right side of the wound. When this suture is drawn tight it slides the aponeurosis of the right side of the wound upon the aponeurosis on the left side of the wound. The process is repeated until the lower angle is reached, when the two ends of the suture are tied. In long wounds two or more mattress sutures are placed to take tension off the lines of continuous suture. The flap is closed with a continuous cumol-catgut suture. The skin is closed with fine cumol-catgut suture by the intracuticular method. When median wounds are long, extending near or above the umbilicus, care is taken to unite the posterior aponeurotic sheath of the rectus muscle with the peritoneum.

It is quite clear that to Championnière is due the credit of having first appreciated the advantage of overlapping the aponeurosis. Apparently, however, he did not realize that the principle had any application elsewhere than in the inguinal canal. With Championnière's work as the basis Andrews developed a special technique for the cure of inguinal hernia and also more fully appreciated the importance of the principle, and claimed that the method could be applied with advantage to the usual celiotomy wounds.

It is evident that the process by which Andrews arrives at this opinion was exactly the reverse of Noble's own experience. A realization of the advantages of the method in a special operation for the cure of inguinal hernia suggested its employment in all other abdominal wounds; whereas Noble's appreciation of the advantages of the method in the closure of abdominal wounds in general led to its employment in special operations on the inguinal canal. The best evidence which he can give as to the practical merit of the method in the prevention of postoperative hernia is the fact that during the nine years in which the method has been in use but a single patient has presented herself with postoperative hernia. Others may have occurred of which he has no knowledge, but it is quite clear that postoperative hernia plays an unimportant role when the aponeuroses are overlapped in the closure of celiotomy wounds.

I can fully endorse Noble's views and recommend his plan of closing an abdominal incision most highly. Personally I use an interrupted suture, but the principle is the same as that advised by Noble and the fascia is overlapped.

Coffey's Operation for Antelexion. Coffey¹ has described an operation for antelexion of the cervix. This operation is somewhat similar to the one described by Baker. It consists of excising from the posterior surface of the uterus at the position of the internal os a wedge of tissue. Reed has accomplished this operation by excising a V-shape piece from above, but Coffey is inclined to believe that the operation should be done from below and preferably without opening the peritoneum. In Coffey's operation he first pulls down the cervix with a bullet forceps; secondly, he inserts into the uterine cavity an instrument which he has devised, which he calls a "cat-claw" tenaculum, which enables him to pull the entire body of the uterus well down. The vaginal mucosa is now incised around the cervix posteriorly and the peritoneum is dissected from the posterior surface of the uterus far enough to excise the wedge. The wedge is excised in the transverse direction and is then closed with catgut sutures. I regard such an operation as entirely unjustifiable. It seems to be a procedure which has great capacity for harm and very little for good; certainly, when the treatment of dysmenorrhea by means of dilatation and the introduction of a Wylie "drain" is so often unavailing, a surgeon would not be justified in using this operation of Coffey's.

Utilization of the Broad Ligaments in Operations for the Cure of Prolapse Uteri and in Hysteromyomectomy. Dudley² has devised a technique for utilizing the broad ligaments in operations for the cure of complete prolapse of the uterus, in hysteromyomectomies, and in removal of uterine appendages. In vaginal hysterectomy the anterior and posterior incisions are made in the usual way; the pouch of Douglas and the utero-vesical cul-de-sac are opened. The uterus is delivered through the incision; the ovarian and the uterine arteries are ligated on one side; the attachment of the uterus to that side are divided; the uterus is now delivered and detached from the broad ligament of the opposite side. The stumps of the right and left broad ligaments are drawn through the vaginal incision by forceps. The anterior and posterior peritoneal incisions are now united between these stumps by continuous suture, which includes part of the stump at both sides. The ends of the stumps are united in the median line in front of the peritoneal closure, and between it and the margins of the vaginal incision.

In the operation for complete descent of the uterus the cervix is drawn down with a tenaculum. An anterior crescentic incision is made at the uterovaginal attachment, the incision extending around the anterior

¹ American Journal of Obstetrics, September, 1906, p. 388.

² Journal of the American Medical Association, vol. xlvii, No. 20, p. 1605.

half of the cervix through the vaginal wall to, but not into, the vaginal tissue. The bladder is now stripped from the uterus by blunt dissection, which is accomplished readily by sponge pressure, which is applied to the peritoneal reflection of the vesico-uterine pouch precisely as it would be if the operator were going to open the peritoneal cavity between the uterus and the bladder. After doing this the vesicovaginal septum is drawn down from the anterior uterine wall by forceps and the vaginal layer of the septum is split in the median line with straight scissors. The vaginal layer of the vesicovaginal septum is now stripped away from the bladder wall to either side of this incision by blunt dissection and the bladder as it is separated is pushed up at the side. The flaps of the vaginal wall are now held apart, exposing the base of the broad ligament on each side. The lower two-thirds of each broad ligament and, in order to avoid wounding the uterine anastomosis, a thin shaving of the cervix are cut away with sharp-pointed scissors. The severed lower two-thirds of the broad ligaments are approximated end-to-end by catgut sutures in front of the cervix. This tends to force the cervix back. The cut ends of the ligaments when united pull down the adjacent parametric structures and in extensive operations the broad ligament. Too tight tying is apt to strangle the tissues, cause the sutures to cut out and prevent union. After uniting the lower two-thirds of the severed broad ligaments in this way in front of the cervix by means of catgut sutures the redundant vaginal wall is cut away on either side; the cut edges are approximated by interrupted sutures. It should be observed that these sutures transfix the uterine wall and thus force the bladder up so that it cannot come down again between the uterus and vagina. This forcing up of the bladder is a very essential factor in the success of the operation.

The idea advanced by Dudley, of using the broad-ligament stumps after hysterectomy to lift the vaginal walls, is an excellent one, and I have recently adopted his plan in one case, with good results. The operation he describes, of suturing the lower part of the broad ligaments together in front of the cervix, appears to me to be inferior to the plan of Watkins, and I should hesitate to employ it.

Intercutaneous Stitch in Plastic Operations on the Perineum. The intercutaneous stitch has given such excellent results in celiotomy wounds that about eight months ago Anspach¹ began to use it in posterior colporrhaphy operations.

The plan adopted was to perform the operation (Hegar or Emmet) according to the customary technique up to the insertion of the external sutures, which are usually introduced from the skin surface of the perineal body.

By this new method the external sutures are introduced and brought

¹ American Journal of Obstetrics, vol. liv, No. 6.

out just within the skin borders of the denudation (Fig. 51). After these sutures are tied the intercutaneous stitch is employed, running from above downward (Fig. 52). The advantages of an intercutaneous stitch are as follows:

The crown sutures are buried; catgut may be used because the sutures are well protected from infection by the neatly approximated skin.

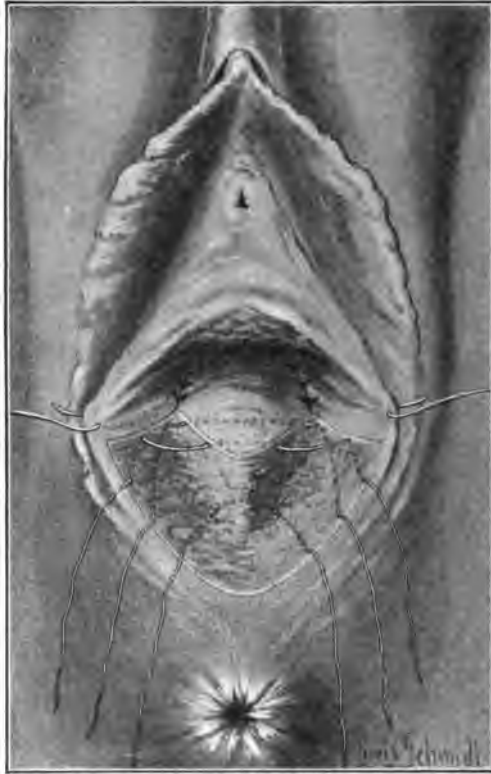


FIG. 51

Catgut may be used throughout the operation, so that there are no sutures which require removal—a matter of considerable importance to many patients.

The pressure necroses and the pitting of tissue commonly observed when the usual external stitch is used are entirely avoided.

I have adopted this method for my plastic work. It has been used in 75 cases in the University Hospital, with uniformly good results. For the first twenty-four hours the patient may complain slightly more of pain than is noticed after the ordinary plastic operation. The difference, however, is very little.

Watkins' Operation for Cystocele. Watkins¹ has devised an operation for cases of extensive cystocele in uterine prolapse. He describes the technique as follows: After the usual preparation the patient is anesthetized and placed in the lithotomy position. The uterus is dilated and curetted as indicated. The anterior lip of the cervix is grasped with a double tenaculum, the anterior vaginal wall is separated from the cervix by a semilunar incision, and the anterior vaginal wall is incised in the



FIG. 52

median line from the cervix to within one-half to one inch of the meatus, care being taken not to injure the bladder. With the finger covered by gauze the bladder is separated from the uterus by blunt dissection. After the bladder has been completely separated from the uterus the uterovesical fold of the peritoneum will be observed as a thin, freely movable layer of tissue between the finger and the uterine body. The peritoneum is either perforated by the finger or is grasped with forceps on either side. The wound of the peritoneum is then stretched with

¹ Surgery, Gynecology, and Obstetrics, June, 1906, p. 659.

two fingers to allow the uterus to be delivered through the opening. One should guard against perforating the bladder with the finger by exerting most of the pressure upon the uterus and not upon the bladder wall.

In cases where difficulty is encountered in separating the bladder from the uterus the procedure can be much facilitated by making this separation upon either side before it is made along the median line, as the attachment of the bladder to the uterus is firmer in the median line than at the sides. The anterior vaginal wall is now grasped on one side at the edge of the incision with an eight-inch forceps and separated from the bladder wall by means of gauze pressure. The same process is carried out on the opposite side. The extent of the separation of the anterior vaginal wall from the bladder will vary in different cases. It should extend over most of the cystocele that comes into view and be sufficiently large to cover the uterus that is brought into the vagina. The uterus is now delivered into the vaginal canal. This may be done by passing the finger over the fundus or over the top of one of the broad ligaments, or the fundus may be grasped with a bullet forceps. One should never attempt to grasp the anterior wall of the uterus and deliver it through the peritoneal opening, as the diameters of this segment are much greater than the diameters of the fundus. A suture is now passed through the vaginal flap near the urethra, through the body of the uterus a little posterior to the fundus, and brought out through the opposite flap at the corresponding points. The placing of this suture should vary in different cases. The fundus should be brought sufficiently downward to support the entire prolapsed bladder wall, but care should be taken not to draw down so firmly that it may press upon the urethra and interfere with urination. This suture is tied and another is passed parallel to it. Two or three such sutures are usually sufficient and there is little traction upon them. The remainder of the wound is now closed with an interrupted or continuous suture.

When the cystocele is very large the redundant tissue of the vaginal vault should be excised. As the posterior vaginal wall in these cases is usually relaxed a posterior colporrhaphy is almost invariably necessary to effect a cure. A perineorrhaphy not only restores the injured vaginal wall, but it also gives additional support to the anterior vaginal wall. The denudation should extend to the upper border of the levator-ani muscle. By this operation the bladder is supported by and rests upon the posterior wall of the uterus. The uterus is elevated from the pelvis by being tipped forward. The twist produced in the broad ligaments by the change in the position of the uterus perceptibly shortens them. This twisting is the chief factor in correcting the uterine prolapse. The tendency of the uterus and the bladder to prolapse following the operation are antagonistic, as any sagging of the bladder increases the anterior displacement of the uterus and any prolapse of the uterus elevates the

bladder wall. Watkins believes that the operation is less dangerous than abdominal section, that there is less suffering, that the convalescence is more rapid, that the displacement is more perfectly restored by this operation, and that the permanent results are better.

The objection to the operation is that it cannot be employed in cases during the child-bearing period. This objection is not so important as might be presumed, as the majority of cases of extensive uterine prolapse and cystocele occur after the menopause. In cases operated on during the child-bearing period a part of the tubes will have to be excised. At the University Hospital this operation of Watkins has been used in 5 or 6 cases during the past year. The technique is comparatively simple and the convalescence in every case has been satisfactory.

How Long Should Patients be Kept in Bed After Oeliotomy Operations?

At present the question of the length of stay of a patient in bed after an abdominal operation is under revision. During the last decade the improvement in methods of suture of the abdominal wall and the almost complete elimination of drainage in the hands of the best surgeons have made it possible to get patients out of bed earlier than it was before. Formerly it was considered unwise to allow a patient to get out of bed before the twenty-fifth to the thirty-first day. Under these improvements, however, in the technique of the operation, it has been possible to very greatly reduce this time, so that patients have usually left the hospital about twenty-one days after the operation. As the following article will show, it is possible to make a tremendous reduction in this time; whether with safety experience alone will show.

From my own personal viewpoint, I cannot believe that the plan which Boldt advocates is a wise one for the majority of gynecological patients. That, however, his advocacy of this method will modify our views, and that we will occupy a middle ground, I am convinced. To allow a patient to get out of bed twenty-four hours after a severe abdominal operation would appear to me to be possibly not so dangerous as painful for the patient. I am sure that the majority of patients, after having undergone complete anesthesia, do not feel sufficiently well to get out of bed the following day if it is possible for them to remain quiet.

As will be seen, however, by the following article, Boldt offers from his own clinical experience a very strong argument for the position he has taken. While I am not willing to adopt this seemingly radical policy which he pursues, I am, however, sufficiently influenced by it to make it a point to get patients out of bed earlier than we have in the past.

Boldt¹ has modified the treatment of laparotomy patients before and after operation.

If the bowels have been regular no preoperative cathartic is given.

¹ New York Medical Journal, January 26, 1907.

A copious enema is employed about eight or ten hours prior to the operation. Immediately before the operation a cathartic is administered, so that its effective action may manifest itself twelve to fourteen hours later; however, if the patient's bowels have always been regular previously the cathartic is omitted.

It is insisted upon that a patient shall not be needlessly kept under anesthesia. The prevailing custom of keeping a patient under full anesthesia fifteen minutes or more before an operation is begun cannot be too severely criticized. A patient need not be under complete anesthesia before the final abdominal cleansing. The operator, assistants, and instruments should be in readiness, so that when the anesthesia is complete the operation may be begun.

The incision is made on one side of the median line, the corresponding rectus muscle being separated by dull dissection with the handle of a scalpel, and the forefingers are then used to complete the separation for the entire length of the incision. The incision should be made sufficiently long to permit of easy access to the site of operation, because it is logical that manipulations are safer when one can see as well as feel. The fact that an incision is an inch or two longer is of no significance so far as the healing of the abdominal wound is concerned, or so far as concerns the probability of the subsequent occurrence of ventral hernia, if the incision is properly closed; in fact, we are likely to secure primary union of such a wound more readily than of one that has been much abused by traumatism during manipulation, as inevitably occurs when the incision is too short.

The abdominal wound is closed in tiers—first the peritoneum, then the posterior sheath of the rectus in instances of long wounds, next the separated rectus muscle with interrupted sutures, next the fascia by overlapping it, so as to have a broader surface of coaptation. The skin is closed with a subcutaneous suture. Chromicized catgut is used for the fascia; for all other suturing plain catgut is used.

Boldt states that he recalls several instances of extensive abdominal operations in which the patients, through inattentiveness of the nurse, got out of bed within twenty-four hours. This occurred even in the days when hard rubber and glass drainage tubes were used, yet the patients were none the worse off for their experience. He knows of one patient who, about the third day, persisted in getting out of bed and walking whenever the nurse was absent. He furthermore states that for more than fifteen years his patients have been permitted to move about in bed as they pleased after abdominal operations, unless there was a strong contra-indication for such permission, and yet he failed to observe any harm resulting from such exertions. Further, from the fact that others have had patients who also without permission left their beds soon after the operation, without experiencing any ill effect, and lastly, because since 1890 it has been his custom to permit his vaginal

hysterectomy patients to walk about any time after the first day, if their condition was favorable, and he has not seen one unfavorable result. He, therefore, asks himself the question: Is it really dangerous for a patient to get out of bed soon after an abdominal operation, when her general condition is fair and proper precautions are taken?

After the completion of a laparotomy in Boldt's hands, a simple dressing is placed over the site of the abdominal incision, consisting of a strip of sterile gauze two and a half to three inches wide and six to eight layers in thickness; this is fastened with two short, narrow strips of adhesive plaster simply to hold it in place while a binder to immobilize the abdominal parietes is adjusted. The bandage used by Boldt to immobilize the abdominal parietes is a Scultetus bandage made of zinc oxide plaster. The full width of the plaster, twelve inches wide, is used, and according to the size of the patient, from twenty-eight to forty inches or more. A small half-circle is cut out at the middle of the lower border, so that during defecation the bandage will not be soiled. The patient is placed upon the bandage so that its lower border comes about on a level with the head of the femur.

The fabric covering on the plaster is peeled off, rolling the patient from side to side in order to facilitate its complete removal. Boldt has found this plan better than that of first removing the fabric before placing the patient upon the plaster; it makes wrinkling of the plaster less likely. Next the plaster is divided on each side into four equal widths and torn as far as the body of the patient. In this way a many-tailed bandage made of oxide of zinc plaster is formed. The zinc plaster is preferable to rubber plaster because of its less irritating qualities. The tails of the bandage are now snugly adjusted, beginning with the lower one and bringing it to the opposite side; then the opposite side is overlapped all the way down to the other side of the patient, thus making a double structure in front and at the sides. This is continued until the four tails on each side are fastened. If the upper part of the bandage should reach to the epigastrium, as would happen in short patients, the topmost tails are not drawn tight. In thin subjects the anterior superior spine of the ileum is slightly padded with gauze. Such a bandage immobilizes the abdomen to a degree that makes it impossible for the abdominal wound to give way as the result of intra-abdominal strain. Boldt considers the bandage a most important part of the after-treatment. In the beginning patients usually complain of the tightness of the bandage, but this feeling generally soon wears off.

Of their own accord patients seldom care to get out of bed until the third or fourth day, yet it has been the author's custom to help all simple cases out of bed within twenty-four hours and have them sit in a comfortable chair, and to coax them out subsequently as much as possible.

No special diet is ordered unless there are particular contra-indications to regular diet; patients get food similar to that they had before the

operation, as soon as the stomach is in condition to retain food after the anesthesia. By the end of the fourth or the fifth day in uncomplicated cases the patients usually walk about as though they had had no operation done upon them.

If there is reason to suspect suppuration of the abdominal wound, the wound is inspected by cutting the bandage in the median line over the gauze layers; this can be done without any marked discomfort to the patient.

Should suppuration be found, the wound is taken care of in the ordinary way and the patient is kept in bed until suppuration has ceased. The cessation of suppuration is hastened by swabbing the suppurating surface with pure carbolic acid and immediately washing it off with alcohol. If no suppuration is found, the bandage is again fastened by applying other strips of plaster over it.

Exceptions to the inducement of early rising, that is to say, within twenty-four to forty-eight hours, are made when a patient's physical condition has been much weakened by illness prior to the operation, or when the patient's pulse rate is much above the normal, or when the nature of the operation has been one of unusual magnitude; then, but only then, no attempt is made to get them out before the end of the fourth day, or not even then if there is any indication for unusual care.

In those cases in which the operation was complicated or in which peritonitis was present before the operation, or in which it was obvious that pathological intraperitoneal secretion would form, so that it was desirable to localize such secretion in the pelvis, or on the first sign of a beginning peritonitis, so that in his opinion it was too hazardous to have such patients out of bed, Boldt has used a bed lifter which he had designed and constructed, which easily obtains the trunk elevation recommended by the late Dr. George R. Fowler.

Patients who are very anemic and in a poor physical condition will be relieved from the immediate effects of the operation if a tight bandage is placed around the upper part of the thighs before the operation is begun, to act as a tourniquet, thus temporarily keeping the blood in the lower extremities, out of the general circulation. As soon as the operation is completed the bandage is loosened, and the extremities bandaged from below upward for a few hours, so as to get more blood into the trunk.

He has found it beneficial to have the stomach thoroughly washed out as soon as the operation is finished. The stomach lavage, while the patient is still on the table, is readily done and saves a patient much nausea and retching.

In many instances one dose of morphine is administered soon after the operation, because it is but seldom that a patient does not complain of sufficient pain to make such treatment not only humane but beneficial

to the patient, acting far better on the heart under some circumstances than strychnine.

He believes that strychnine is used far too extensively and indiscriminately, both during and after operations, whereas intravenous saline infusions are often too long delayed, and the administration of a dose of morphine after an operation is too much dreaded by many.

If the bowels do not move spontaneously within twenty-four hours after the operation as the result of the cathartic not infrequently given before it, no attempt is made to bring about an action, because usually this occurs spontaneously about the fourth or fifth day, and should it not, then, if the patient feels uncomfortable, a saline laxative is given.

Boldt states that Ries wrote him on November 1, 1906, that he had used this heretical after-treatment in more than 500 cases without having observed any untoward result that he could attribute to it. Boldt has had 384 cases and not a bad result which could in any way be attributed to the early arising from bed. He states that he has knowledge of others who upon his suggestion, and after seeing some of his patients, adopted the plan. This brings the total number up to more than 1000 cases; and yet no unfavorable result has been reported to him.

The method is applicable in about 85 to 90 per cent. of the patients subjected to abdominal section by gynecologists. On the first day or two that patients are taken out of bed, they usually walk only a few steps, from the bed to the chair and then remain in their chair. They are allowed to remain up as long as they wish; on the first occasion the time is from three-quarters of an hour to two hours, and in the afternoon this is again repeated. Every day, however, the time of being up is increased, likewise the amount of exercise. Of course, as might be expected, patients sometimes protest, but a little coaxing usually induces them to acquiesce. It is certainly remarkable to see the physical condition in which such patients are after two weeks have elapsed, compared with that of those who have been kept in bed on the customary treatment. Those kept in bed are urged to do some calisthenic work with their upper and lower extremities while still on their back, unless they are too prostrated. Five minutes every hour or two is of some benefit to keep the lethargy out of their muscles and cause better circulation.

It is of decidedly more advantage to a patient under ordinary circumstances to allow her to spend the first week partly in bed, and to induce her to take moderate exercise. Most patients upon whom operations are done for primary surgical diseases do not have their health improved by bed rest, but, on the contrary, their muscular system becomes more or less atrophied and they lose strength, because all the physiological functions become more or less impaired by the enforced quietude. The only class of patients who would be benefited by bed rest are extreme neurasthenics, and they only if they are properly fed and in addition get methodical general massage daily.

Particularly in complicated panhysterectomies with suppurating tuboövarian inflammation, with or without vaginal drainage, Boldt has found the method which he advocates of very superior advantage. The vaginal gauze drain does not prohibit a patient from sitting up and taking light exercise. Besides, in from twenty-four to forty-eight hours the packing is removed, and less is replaced if one thinks it desirable to have some protection in the vaginal vault.

Ries does not use any binder, and yet he has not observed a single hernia except in one instance of an infected wound. Boldt states that he has been too timid to take such a chance, feeling safer if the abdomen was immobilized, though it certainly causes more or less discomfort to the patients, especially during the first few days.

The most serious objection which has been urged against the early getting out of bed is the danger of *thrombosis* and *embolism*, especially after operations for myofibromas. Boldt insists that this protest is based only on theory, so far as his experience goes. Thrombosis and embolism occur not infrequently after abdominal operations when the sacred plan of rest in bed for three or four weeks is adhered to. It occurs occasionally even without any operation, especially in fibroids. It is an unfortunate result of this form of neoplasms, which not infrequently cause cardiac changes. He has not seen a single instance up to the present time following his myoma operations with the plan of treatment advocated, and yet some of the myofibromas removed have been very large. Pelvic elevation during operations is far more risky in causing undesirable results, fortunately not permanent, than early rising after laparotomy.

Boldt believes that the occurrence of thrombosis may occasionally be attributed to circulatory disturbances brought about by enforced absolute quiet in bed. In this way there occurs inactivity of the muscles and a diminished propelling power of the heart, which causes retardation of the circulation. There is no better way of keeping up a good circulation than by taking rational exercise. The fact that thrombosis, if unilateral, has usually been observed on the left side may probably be accounted for by the greater length and the course and relations of the left iliac vein. Muscular inaction, the change in the blood pressure, and the interference with the circulation on the left side are the main causes. Boldt found that patients who got up within a week did not have phlebitis. He now bends every effort to get his patients about early; and those compelled to remain in bed he urges to move their limbs.

William J. and Charles H. Mayo, during 1904, in 1788 abdominal operations, had about 1 per cent. of left-sided *phlebitis*. Many of these were mild. For the last year and a half, since they have not enjoined bed rest so strictly, but have endeavored to get their patients about as soon as possible, they have seen it very rarely, not to exceed more than 0.3 per cent. In 1905 they had, in 2157 abdominal operations, 2 deaths

from embolism. One was after an operation on the gall-bladder and the other a hysterectomy, and also 2 pulmonary embolus cases in which the patients recovered.

What are the advantages of the non-restriction in diet and the inducement to have patients move about and get out of bed soon after abdominal operations, unless there are some very decided reasons to contra-indicate this plan of treatment? Boldt states that he answers the question only from his observation in personal experience; empirical if you please.

It is important to take a series of complicated operations, treated on the plan suggested, and compare that number with an equal number of patients with about similar complications, treated by the generally approved method. He has gained from such a comparison the impression that the mortality rate is lower in the first class. This, of course, he is not in a position to prove; it is simply an impression gained by observation. Next there is less nausea and vomiting, also less abdominal distention, because flatus is passed more readily when patients are sitting up. Spontaneous action of the bowels occurs earlier. There is less liability to bronchial and pulmonary complications. There is less liability to circulatory disturbances. There is better assimilation of food. There is less weakening of the general physical condition of the patient. In short, there is more rapid recovery to working ability.

What are the disadvantages? If the case is at all suitable for the treatment, there are no disadvantages so far as Boldt's experience goes.

The application of a tight bandage around the upper part of the thighs, to keep a blood reservoir in the lower extremities, in exsanguinated and very weak patients, is excellent. The same may in exceptional cases be done with one of the upper extremities. These bandages are taken off as soon as the operation has been completed, and thus more blood is thrown into the trunk.

The intravenous infusion of a 0.9 per cent. saline solution should not be too long delayed when the condition of the patient makes it evident that its employment may be of benefit. In instances of large myomas, where the patient has been much exsanguinated by bleeding, it is desirable that the infusion be begun as soon as the patient is fully under an anesthetic, so that by the time the operation has been completed about 1000 to 1500 c.c. may have been infused.

SPINAL ANESTHESIA IN GYNECOLOGY.

There is no doubt, says Baisch,¹ that the gynecologist has particular occasion to be thankful for Bier's discovery of lumbar anesthesia and to

¹ Deutsch. med. Wochenschr., Band xxxii, Nr. 38, S. 1537.

follow its advance with great interest. All gynecological operations have to do with areas which are affected by lumbar anesthesia, namely, the external genitalia or the parts lying in the lower abdominal or pelvic cavity. When the transverse suprapubic incision is used this method is particularly satisfactory. The nerve supply of the skin, as well as of the peritoneum, of these regions is derived from the sensory roots, which pass out between the tenth and the eleventh dorsal vertebrae. These nerves are affected, as a rule, by injections between the second and third lumbar vertebrae. Lumbar anesthesia has already given promise to become the sovereign method of anesthesia in gynecology. The majority of gynecological operations on the external genitalia, including round-ligament operations, are not of sufficient relative importance to demand general anesthesia with ether or with chloroform; but they are sufficiently complicated so that local anesthesia is of no use.

Notwithstanding these facts there is little general disposition to extensively employ lumbar anesthesia. A reason for this is found in the fact that female patients are especially favorable for inhalation narcosis. They are not accustomed to the use of alcohol and they are not so subject to myocarditis or to cardiac dilatation. Baisch says that since March, of 1906, Bier's method has been used extensively in Döderlein's clinic. In order to gain a knowledge of the advantages and the disadvantages of different materials, they have used in combination and alone stovaine, novocaine, and tropacocaine, and they are able to report at present concerning 150 cases of anesthesia, among which were 40 laparotomies, some of them of the severest and the most extensive sort. They have also in the course of their experience modified the procedure by the use of scopolamine and morphine in order to obviate certain disadvantages which lumbar anesthesia entails.

It is very clear that lumbar anesthesia must have certain distinct advantages if it is to displace inhalation narcosis in general. Taking up the disadvantages, Baisch first speaks of the retention of consciousness. This is not as a rule desirable in an operation, for several reasons. A severe radical operation for myoma or carcinoma, lasting for an hour or longer, cannot be looked upon with indifference when the patient is conscious; the long continuation of the Trendelenburg posture alone in such operations is unpleasant from the first to the patient, and toward the end of the operation it becomes almost unbearable. This position is almost indispensable for carcinoma operations, and in many others it is of great advantage. It is true also that the fullest effect of a lumbar injection is obtained by this position. It is only in the smaller operations on the perineum or vagina, and in the case of the Alexander-Adams operation, that the retention of consciousness is unobjectionable; and even in many of these cases consciousness is more painful than agreeable.

Considering the actual danger to life of spinal anesthesia, the author

believes, notwithstanding the cases which have been reported in the literature, that the accidents have resulted solely from an excessive dosage. He speaks of König's case of paralysis of the respiratory nerves. He also speaks of the severe persistent case of paraplegia of Hildebrand, of the case of Donitz, and of Freund. Also those of Trantenroth and Heinecke-Lawin. Some of these accidents are prevented not only by a smaller dosage, but also by the use of tropacocaine instead of stovaine or novocaine. Complete paralysis of the thighs appears later after using tropacocaine than either of the others; it disappears also a half-hour after the injection; whereas in stovaine and novocaine it lasts for three or four hours.

The most severe and disagreeable after-effects of lumbar anesthesia are headache and vomiting. This has not been given sufficient attention in publications heretofore. Baisch has observed it in his own cases about 45 times, and if the frequency of such after-effects is not so very great this is more than made up by their severity. In 3 cases there was severe headache, which, in spite of any treatment, lasted over a week. In 3 other patients continuous, persistent vomiting for several days became almost uncontrollable. One very seldom sees headache after ether or chloroform narcosis, and the vomiting as a rule stops after the day of the operation. Only exceptionally do nausea and vomiting occur on the next day.

Even though there is no headache or vomiting, spinal anesthesia is by no means an indifferent procedure to the patient. The prostration seen after ether and chloroform is by no means absent in spinal anesthesia. Quite commonly afterward there is a depressed condition. Only a few, for example, have an appetite for fluid nourishment, and most of them have a great distaste for food or drink. Nausea and vomiting lasting one or several hours is quite common. All in all, these disturbances are really much less as a rule than after ether or chloroform, but they are not so trifling as has been hitherto reported by those who favor lumbar anesthesia. Severe and continuous disturbances, headache, and vomiting have been found in about half of the cases in which the novocaine and stovaine were used, but in only one-eighth or one-seventh of the tropacocaine cases. The cases of persisting disturbances related above occurred mostly after stovaine and novocaine, once only after tropacocaine.

The cause of these after-disturbances has been attributed by Schwartz to the technique of injection. Baisch, however, differs from him in this and comes to the conclusion that the cause of it lies in the chemical used. Thus he finds that the tropacocaine is less likely to cause disagreeable after-effects than any other drug, and he hopes that in the future a new chemical will be discovered which is even more suitable than tropacocaine. Furthermore some of the individual disagreeable after-effects are due to the disposition of the patient. Such patients as frequently

complain of headache or suffer from migraine or who have nervous stomachs, are especially predisposed to these disagreeable after-effects. This influence of disposition was shown very clearly in a very neuropathic patient who after spinal anesthesia had an attack of typical tetany. In this patient it was not so much the particular anesthetic as it was the individual predisposition.

Concerning these disadvantages of lumbar anesthesia Baisch concludes that danger to life may be avoided by limiting the dose of novocaine to 0.1 gram, of stovaine to 0.05 gram, and of tropacocaine to 0.05 gram. Headache and vomiting after and consciousness during a prolonged laparotomy he believes may be set aside by selecting the patients, by using tropacocaine, and by combining spinal anesthesia with the injection of scopolamine and morphine, and the use, if necessary, of a small quantity of ether or chloroform. This is a combination which Krönig recommended at the last Surgical Congress.

According to this plan two hours before operation the patient is placed in a darkened, quiet room, and is given an injection of 0.0003 gram of scopolamine and 0.01 gram of morphine. This injection is repeated in an hour. Directly before the operation the patient is brought to the room for disinfection. At that time usually patients are asleep or at least they are so sleepy that they take no notice of the disinfection. The lumbar injection is made directly before operation. The patient is placed on the operating table in the Trendelenburg position and by the time the sterile towels are placed in order to isolate the operative field the area of anesthesia has usually reached the navel. If the patient is not asleep by this time she usually becomes so within a few minutes. Only a few excitable and especially anxious patients do not become fully unconscious, but they are benumbed and do not have a full realization of the situation. The sleep is light, so that it can be broken at any time by nudging the patients, but they fall asleep again soon after. In this Krönig and Penkert see the humanity of the method. In other words, the patient is saved the anxiety of the operation and the unpleasantness of the Trendelenburg position. If toward the close of a long operation the patient awakens and begins to complain of pain, it is easy to give a few whiffs of ether or chloroform. Patients take this without excitation and usually not more than 5 to 10 grams of ether are necessary.

It has not been possible in every one of Baisch's cases to cause sleep before the beginning of the operation. This may have been due, he says, to the fact that he did not have all the accessory means which Krönig advises, such as the dark glasses and rubber ear plates. The subcutaneous injection of scopolamine and morphine can be quite easily given by the nurse. Krönig has never required an inhalation of ether, though he employs larger doses of stovaine and scopolamine. The method is not dangerous. The occurrence of vomiting and headache afterward is not nearly so marked and is very rarely severe, although

the author cannot agree with Krönig that headache only exceptionally occurs. In his (Baisch-Döderlein) 25 laparotomies with combined anesthesia, he observed headache and vomiting of several days' duration five times. The cases were divided equally between stovaine and tropacocaine. In spite of the small quantity of the anesthetic—scopolamine 0.0006 gram, morphine 0.02 gram, tropacocaine 0.05 gram, ether 5 to 10 grams—the action is entirely satisfactory. The relaxation of the belly wall and the quietness of the bowel are as great as after narcosis by ether or chloroform. There is no pressing down of the bowel after opening the abdomen; the intestines fall out of the pelvis, leaving the field of operation in the small pelvis free. The author has also used this method of spinal anesthesia in obstetrical work.

Von Arlt¹ has invented an ingenious method of technique for lumbar anesthesia. The apparatus consists of a phial blown out of glass which ends in a curved tip having a ground-glass tip fitted with a metal cap. At the other end of the phial the cylindrical body joins a spherical part which ends in a funnel-shaped base-piece. The end of the tip fits into a needle furnished with a stop-cock and a mandrin. The needle is 10 cm. long, marked in centimeters. The apparatus also comprises a rubber bulb with a conical tube fitting into the base-piece of the spherical part of the phial. The apparatus is used as follows: The phial is well cleaned with ether and alcohol and dried in an oven. The metal cap is placed upon the tip of the phial and through the base-piece 5 to 7 cm. of tropacocaine or any other anesthetic is placed in the cylindrical part. The spherical part is loosely filled with cotton. The phial so prepared is laid in a metal box and sterilized for thirty to sixty minutes at a temperature of 120° C. The needle is cooked with the instruments and so is the rubber bulb. The technique of lumbar anesthesia is as follows: The patient sits or lies with the back well arched. The skin is disinfected and the puncture is made close to or in the median line between the second and third, the third and fourth, or even between the first and second lumbar vertebrae, the incision being 0.3 to 0.5 cm. long. After the mandrin is removed and the cerebrospinal fluid begins to flow, the stop-cock is closed. The operator takes from the open metal box the phial and by lightly tapping it throws the tropacocaine toward the tip-piece and attaches the end of the tip-piece to the needle, after removing the metal cap. The stop-cock is now opened. The tropacocaine is very quickly dissolved in the cerebrospinal fluid which flows into the phial, and this is assisted by opening and shutting the stop-cock and turning the phial backward and forward. 3 to 4 c.c., that is, a half-filling of the cylindrical part of the phial, usually suffice for the solution. When smaller amounts of liquor are used the process requires a longer time. As quickly as sufficient

¹ Münch. med. Wochenschr., Band liii, Nr. 34, S. 1660.

fluid has entered the phial the stop-cock is closed and the operator waits until the very last grain of tropacocaine is dissolved. Then the rubber ball is attached to the base-piece of the apparatus and through pressure upon it the solution is slowly injected. The other hand rests upon the stop-cock, which is shut off before the last drop of the fluid is pushed out of the phial. This is in order to prevent the passage of air into the dural space. The special advantages of the instrument are as follows: The tropacocaine is dissolved in the same vessel in which it is sterilized and comes in contact with no other body. This assures the cleanliness of the preparation and protects against the decomposition of it through contact with soda solution or with any antiseptic used. The waste of cerebrospinal fluid and tropacocaine solution is almost *nil*. The procedure can be very quickly and simply carried out. It is possible also, without any great difficulty and without danger, to make such an injection outside of the hospital, and the operator does not need any assistants. Von Arlt has seen this procedure carried out in about 150 cases which he will report later, together with his experience in 500 lumbar anesthetics.

Although I have had no experience with spinal anesthesia and see no indication for it except in cases where the operation is to be a very long one, the excellent report of Baisch might lead me to try it in radical operations for carcinoma of the cervix. The use of scopolamine and morphine in combination with spinal anesthesia will add to its advantages and take away some objectionable features.

DISEASES OF THE BLOOD. DIATHETIC AND METABOLIC DISEASES. DISEASES OF THE SPLEEN, THYROID GLAND, AND LYMPHATIC SYSTEM.

By ALFRED STENGEL, M.D.

THE BLOOD.

Pernicious Anemia. The question of most interest in relation to this disease as brought out by the more recent writers is to what extent we may look upon this condition as a distinct entity. There are so many conditions that give the clinical picture of pernicious anemia, in which the anemia is secondary to some infection or invasion, and each year cases are reported showing new factors in its production, that one cannot describe a case as idiopathic "progressive pernicious anemia," unless these other causes have been positively excluded. Another point of interest is the relation that the various types which have been described bear to one another, and the factor or factors controlling or governing the development of these types. The present views of the various writers upon the question of division of pernicious anemia into the *plastic* and *aplastic* types all speak for this classification.

The first is the ordinary form. Here we have a distinct reaction on the part of the bone-marrow to compensate for the destruction of red blood cells. This reaction is manifested by the presence of elements in the circulating blood which are recognized as being formed in the bone-marrow, and which have not had time to undergo the successive transformations necessary to bring them up to the full stage of development. Thus one finds microcytes and megalocytes, normoblasts, microblasts, megaloblasts, polychromatophile erythrocytes, metrocytes, myelocytes, and Türck's cells (stimulation forms).

The aplastic form, although having much in common with the other form, has many features which separate it distinctly from the above. Here we find a complete absence of medullary reaction and also the absence of young cellular forms from the circulating blood. That in the latter type we may have a reaction on the part of the marrow under some excessive stimulus is maintained by Chauffard and Laederich,¹ who report 2 cases, 1 of which supports this view. That the reaction

¹ Revue de médecine, xxv, No. 9.

may be merely temporary, however, is shown by the fact that 1 case (Case II) relapsed in a very short time after being considered on the way to recovery. There seems to be a difference of opinion as to whether the form of anemia can be absolutely distinguished by the blood findings; in other words, whether there is a distinct parallelism between the blood picture and the condition of the bone-marrow. These authors present the reports of Labbé and his associates, who found that several cases of an aplastic type, so estimated from the blood examination, eventually proved to have had a distinct medullary regeneration. Here the elements formed by the bone-marrow did not appear in the blood, being "without doubt destroyed *in situ* by a hemolytic process." They believe that even if the blood examination does not give data proving this form to be a clinical entity, it gives information of inestimable value in prognosis, but only when the examinations are repeatedly and carefully made.

Aubertin¹ also lays great stress upon the importance of repeated examination of the blood and the correct interpretation of these findings in determining the form of anemia. He, however, insists upon the value of this parallelism between the bone-marrow and blood findings. He points out that there are two processes to be considered, that of degeneration of the elements in the bone-marrow and that of the destruction of these elements in the circulation and the hemolytic organs. The distinction between a destruction and a failure to form these elements can only be determined by a qualitative study of the blood, and not by a quantitative study. In the aplastic form the lowering of the absolute number of polymorphonuclear leukocytes (the lymphocytes retaining their normal absolute number, but being relatively increased) and the absence of myelocytes would make one think that the bone-marrow is weakened in the production of leukocytes; and the absence of polychromatophilia, of dwarfed and giant reds, and of nucleated reds would make one think it had been weakened in its capacity to make red corpuscles. The autopsy findings prove this to be the case; the bone-marrow is yellow, fatty, and inactive. The clinical course of these cases, rapidly fatal, also proves it in an indirect way.

That this aplastic feature may also occur in anemias concerning which one is in doubt as to whether they may really be classed as pernicious anemia, is shown by Hirschfeld,² who reports 2 cases. They had many features in common with the aplastic type and therefore should probably be classed with these cases.

This question of aplastic anemia and its relation to the plastic form is considered by Lavenson,³ who reports the clinical and autopsy findings in a case under my care. He also gives a collection of 10 cases

¹ Semaine médicale, xxvi, No. 33.

² Berliner klinische Wochenschrift, xliii, No. 18.

³ American Journal of Medical Sciences, January, 1907.

reported in the literature, with clinical data, etc. He sums up his conclusions as follows:

"1. Aplastic anemia is a variety of progressive pernicious anemia.

"2. The essential features of aplastic anemia are: a rapidly fatal course; a marked reduction in the number of red blood corpuscles; a greater proportionate reduction in the amount of hemoglobin, resulting in a low color index; a leukopenia with a relative lymphocytosis; an absence of megaloblasts, and usually normoblasts. Postmortem: the characteristic finding is a pale bone-marrow in which the signs of erythrocytic and granulated leukocytic formation are wanting.

"3. The differences between aplastic anemia and the usual form of progressive pernicious anemia result entirely from the absence of regenerative processes in the former.

"4. The blood picture in aplastic anemia is the result of two factors: one the hemocytolysis and the other the failure of regeneration on the part of the bone-marrow."

"5. The failure of regeneration of the blood elements of the bone-marrow represents the result of one of the three following conditions: (a) a simple deficiency of the regenerative powers; (b) an inhibitive action on the bone-marrow by the factors producing the destruction of the blood elements; and (c) a true aplasia of the bone-marrow. If there be a true aplasia, it is probably of recent origin, for if it were of long duration there would in all probability have been manifestations of a deficiency in blood formation before the advent of the hemolytic agent.

"6. The relations of lymphocytes to leukocytes and red blood corpuscles in aplastic anemia lend evidence to the view that lymphocytes are not a specific product of the bone-marrow."

To our knowledge of progressive pernicious anemia very little has been added during the year. As stated, most attention has been directed toward separating those cases which have definite discoverable etiological factors. In this regard it is frequently almost impossible to distinguish clinically the infectious cases of secondary anemia from true pernicious anemia. Therefore they should never be placed under the second heading until every means at our disposal for determining the question of infection has been exhausted.

Brugnola¹ reports 2 cases similar to those published by Baccarani and Arullani, in which an organism was isolated from the spleen (by puncture) having all the characteristics of the *Micrococcus tetragenous albus*. The first case occurred in a woman of forty years, very pale and slightly edematous. The red corpuscles numbered 668,000, with increased color index; poikilocytosis, macrocytes, and microcytes; and there were 4000 leukocytes, with a relative mononuclear increase. The case presented slight enlargement of spleen and lymph glands, and a hemic

¹ Riforma Medica, xxii, No. 35.

murmur was heard over the heart. The examination of the feces was negative. The Widal and tuberculin tests were negative. The recovery was slow, the patient leaving the hospital three months later with a red blood count of 2,518,000, a low color index, and a leukocyte count of 8000, with a marked polynuclear leukocytosis. The second case was less severe, but very similar to the above. The patient had retinal hemorrhages in addition to the other findings. Both cases recovered after two or three months on general hygienic and iron treatment.

That anemias of this character may frequently develop during the puerperium has been previously noted. Meyer-Rügg¹ reports a case of this kind complicated by *septic infection*. The patient developed anemia, torpor, nose-bleed, elevation of temperature, and rapid pulse, accompanied by chills. The blood showed marked increase of leukocytes, 30,000 per cm., giving the following differential count: neutrophile myelocytes 25.3 per cent., neutrophile polymorphonuclear 49 per cent., small lymphocytes 20 per cent., plasma cells 0.5 per cent., transitionals 1.1 per cent., large mononuclears 1.1 per cent., myeloblasts 2.1 per cent., eosinophiles and mastzellen none. The reds showed marked anisocytosis, moderate poikilocytosis, numerous megalocytes, few mormoblasts and megaloblasts. Unfortunately blood cultures were not recorded. The autopsy showed a septic thrombosis of the ovarian veins; the bone-marrow of the femur was pinkish to red, but by no means yellow.

Mouisset, Mouriquand, and Therenot² observed a most interesting case of anemia belonging to this class. A woman, aged twenty-nine years, entered a hospital on account of an obscure febrile condition from which she had suffered one month. There was general depression and signs of weakness, associated with extreme pallor; her skin was of a yellow color and waxy, and the mucous membranes were colorless. Blood examination showed a condition analogous to that found in pernicious anemia. The reds were 1,084,000; the color index was about normal; poikilocytosis and a few nucleated reds were present; the white cells were about normal in number, with a relative increase of mononuclear forms. The spleen was slightly enlarged. Blood culture showed *typhoid bacilli* in abundance and the Widal test was shortly afterward positive. This was a distinct case of typhoid bacteremia and not typhoid fever in the ordinary sense.

Labbé and his associates have reported several cases of *chronic nephritis* which presented the picture of pernicious anemia, completely masking the true condition.

Pater and Rivet³ report a case of *tuberculosis* presenting this condition as a terminal manifestation.

What the relation of this form of anemia may be to certain forms of

¹ Centralblatt f. Gynäkologie, xxx, Nr. 34.

² Reported in editorial in Semaine médicale, xxvi, No. 51, p. 602.

³ Tribune médicale, April 22, 1905.

leukemia is not fully understood. Chauffard and Laederich¹ have observed a case of lymphatic leukemia and one of acute leukemia in which the red cells presented this type of anemia. Aubertin² has also observed it, and Wassmuth³ has observed the development of pernicious anemia with a fatal result in a case of lymphatic leukemia treated by the x-rays. I have on several occasions observed instances of leukemia in which the leukemic condition of the blood practically disappeared under treatment, leaving a blood picture scarcely, if at all, distinguishable from that of pernicious anemia.

A. Berti⁴ contributes an article on the pathogenesis of the anemia in *ankylostomiasis*, concluding that it was certainly due to a virus, and that the worm in the majority of cases was the origin of the virus; that this produced a general depression which was more marked in the bone-marrow than elsewhere. The pernicious anemias present a different clinical picture from the severe anemias of infectious origin; they are much slower in their development, and those showing this slow development have always given negative blood cultures. On the other hand, when one meets with a severe anemia, febrile, accompanied by slight enlargement of spleen and lymph glands, of acute or subacute type, one should take it to be an anemia symptomatic of septicemia; and a blood culture should always be made. This is important not only from the standpoint of diagnosis but also from that of prognosis; for these secondary anemias, in spite of an extremely low red count, may improve and recover fairly rapidly; this is very exceptional in chronic pernicious anemia.

TREATMENT. That cases of pernicious anemia may recover is shown by the reports of Menetrier, Aubertin, and Bloch,⁵ who report a case of marked pernicious anemia in which, under the influence of treatment by fresh bone-marrow alone, the reds increased from 680,000 to 3,000,000 in five weeks, with a disappearance of the symptoms. They explained the result by the marked myeloid reaction present in this case, showing 5 per cent. myelocytes and 5 nucleated reds to 100 leukocytes. As all authors admit, this remedy is completely useless in the aplastic type. The results obtained from the use of bone-marrow, they state, are directly in proportion to the amount of myeloid reaction present, the best results being obtained in those cases in which this reaction is most marked.

Chace⁶ also reports a case presenting the clinical features and blood findings of pernicious anemia, which recovered.

Chauffard and Laederich⁷ lay great stress upon the value of bone-

¹ Loc. cit.

² Semaine médicale, June 14, 1905.

³ Wiener klinische-therapeutische Wochenschrift, 1905, Nr. 46, p. 1151.

⁴ Gazzetta degli Ospedali, xxvii, No. 39.

⁵ Bulletin de la Société des hôpitaux de Paris, April 13, 1905, p. 315.

⁶ The Postgraduate, New York, January, 1906.

⁷ Revue de médecine, xxv, No. 9.

marrow in these cases. Their method of treating these cases is as follows: They first give a tenifuge to be certain that no intestinal parasites are present. They use iron and oxygen, but do not insist upon the former, as they find very little if any effect from it; the latter they believe of value on account of its general stimulating effect upon the organism. They consider arsenic valuable especially when combined with bone-marrow treatment. They give it hypodermically, using the following formula:

Arsenite of potassium	0.20 gram. (gr. 3).
Chloride of sodium	0.27 gram. (gr. 4).
Distilled water	20.00 c.c. (f 5 5).

Of this mixture they give 6 to 20 drops a day hypodermically in increasing doses, starting with the smaller and gradually raising it to the latter, with intervals of rest for eight days every two or three weeks. The injections give very little pain, indeed are often completely painless. The authors have never seen any signs of intolerance follow this method of administration.

The bone-marrow they obtain from the long bones of the calf, and it must be fresh, being then much more active than the alcoholic or glycerinated extract. It is very important to see that it is red bone-marrow and that it is active, this being determined by a microscopic examination if necessary. The bone-marrow is given in doses of 40 to 100 grams per day, the amount depending upon the tolerance of the patient. It is usually well accepted by the patient, either cut up or crushed in a little tepid bouillon.

Renon and Tixier¹ report a case treated by means of Fowler's solution with a distinctly unfavorable result. It was then treated by the x-rays alone, with some improvement. They then supplemented the treatment by the rays with diphtheria antitoxin, with further improvement. They finally gave the antitoxin without any other treatment, and had a very favorable result. They believe the myeloid reaction observed in this case under the influence of this treatment was due to the stimulation of the marrow by the leukolysins and hemolysins produced by the x-rays and the diphtheria antitoxin respectively.

Berti² has been testing cases of anemia, due to the uncinaria, with specific hemolysins, produced in serum of guinea-pigs which had been injected repeatedly, over a long period of time, with blood serum from cases suffering with this disease. The patient's serum was first heated to 56° C. for half an hour to destroy the Ehrlich complements. He has had a favorable experience with this serum from the guinea-pigs, in 3 patients suffering from uncinariasis, and considers it a valuable adjunct in the treatment of the anemias of this condition.

¹ Bulletin de la Société des hôpitaux de Paris, March 15, 1906.

² Gazzetta degli Ospedali, xxvii, No. 21.

Secondary Anemias. **EXPERIMENTAL ANEMIA.** The grave secondary anemias have already been considered under Pernicious Anemia, on account of their frequent close resemblance to that condition. The experimental anemias which have been studied during the past year seem very interesting and important on account of their bearing upon the pathogenesis of this condition. Bunting¹ produced anemias in rabbits by the intravenous injection of ricin and saponin, and studied their effects upon the blood and bone-marrow of these animals. From previous experiments he obtained the idea that the red marrow of these animals consisted of a patchwork of cells arranged in groups or proliferating centres; certain groups were composed of indifferent myeloblasts at the centre surrounded by myelocytes, and at the periphery close to the capillaries the mature polymorphonuclear cells; others were composed of immature red cells or even indifferent myeloblasts at the centre, and surrounding this, layers of megaloblasts, intermediate red cells, and normoblasts and peripheral layers of mature red cells; while still others showed lymphoid cells forming the peripheral layers. He brought out this arrangement best by depleting the bone-marrow of the mature cells; for example, the polymorphonuclears after an intraperitoneal or intrapleural injection of aleuronat. He thus obtained a migration of the mature polymorphonuclears from the marrow to the site of injection, making the erythrogenetic groups and the groups of myelocytes stand out very distinctly. The marrow of the animals killed forty-eight hours after the injection showed an entirely different condition. The marrow was extremely cellular, large groups of myelocytes were present with numerous mitotic figures, and on the periphery of these groups were numerous polymorphonuclear leukocytes.

The effect of a fatal dose of ricin on the leukocytes is a destructive one, leading to a leukopenia of a few hours' duration, followed by a sharp reaction, but among the cells of this leukocytosis were many that showed signs of injury. His experiments showed that the action of ricin on the red corpuscles, when injected intravenously, was one of destruction, affecting not only the circulating erythrocytes, but also those in the marrow and the erythroblasts in the marrow, as shown by the fragmented pyknotic nuclei seen in the section of the marrow, and by the naked red-cell nuclei found in the circulation. "This destruction results in a diminished red-cell count and in the appearance of a large number of nucleated red cells, both normoblasts and megaloblasts, in the circulation; and, if the intoxication is continued, in the appearance of pathological forms of erythrocytes in the circulating blood, giving a picture resembling that seen in pernicious anemia in human beings, and one entirely different from that following severe hemorrhage." In tests with saponin he found he was able to give

¹ Journal of Experimental Medicine, October 12, 1906.

it over a longer period of time, as a tolerance to it was not so easily established. In the use of this he found a similar effect upon the red cells and marrow. After twenty-seven days, during which the animal received eight injections of saponin, there were very striking changes: the marrow tissue was found to be replaced by an extreme scar-tissue formation limiting the blood-forming cells in distribution and number; the spleen was enlarged; the peripheral venous sinuses were dilated and crowded with cells of the marrow type, chiefly of the erythrocytic series, but including many megalokaryocytes and leukocytes. This he regards as a positive proof of the vicarious formation of blood cells in the splenic sinuses, a condition similar to that described by Meyer and Heineke¹ as occurring in severe anemias, and which he has also seen in the spleen in pernicious anemia.

When these hemolytic toxins were injected subcutaneously, the absorption was so slow that the effect was upon the circulating blood and not upon the marrow. Then there is destruction of blood cells, but no nucleated red-cell crises in the circulation, and the marrow picture is such as is seen after hemorrhage; *i. e.*, the marrow of the secondary anemia.

M. Rothmann² found, in poisoning dogs with pyrocin, anemia with numerous normoblasts, but no megaloblasts. The hemoglobin was reduced, but the amount was difficult to estimate on account of the hemoglobinemia. The bone-marrow, showing no resemblance to that of pernicious anemia, contained normoblasts, but no megaloblasts, and consisted chiefly (and in large numbers) of the Naegeli myeloblasts (large basophile "Stammzellen"). He concludes that the myeloblasts have nothing to do with the formation of red blood corpuscles.

The relation of anemia to defective gastric juice is considered by Rollin.³ His clinical experience indicates that in patients with insufficient secretion or absence of gastric juice there is always evidence of anemia. In hyperacidity the hemoglobin was above normal, and in nervous dyspepsia it did not differ materially from normal. Anemia was a constant finding only, in cases ranging from subacid gastritis to gastric achylia. He found that the administration of natural gastric juice from the dog after the method of Pawlow was followed by a subsidence of the anemia. He believed this supplementary gastric juice provided or ensured proper nourishment for the elements of the blood.

Unruh⁴ holds that the so-called *school anemias* may be usually ascribed to myocarditis, albuminuria, or hypoplasia of the heart and bloodvessels. He states that myocarditis occurs much more frequently than is usually recognized, not only after diphtheria and scarlet fever, but even

¹ Verhandlung der Deutsche Pathologische Gesellschaft, 1906, ix, 224.

² Deutsche medizinische Wochenschrift, xxxii, Nr. 4 und 5.

³ Berliner klinische Wochenschrift, xliii, Nr. 5.

⁴ Deutsche medizinische Wochenschrift, xxxii, Nr. 41.

after the more mild infections, such as tonsillitis. Although the child suffering from these conditions need not necessarily be kept from school, he should be kept from severe physical strain and should not be allowed to indulge in bicycling, swimming, gymnastics, etc., with the other children. Patients recuperate quickly, under the proper treatment when spared unnecessary exercise and strain.

F. C. Sondern¹ contributes an article on the general question of *anemia in pregnancy*. Labbe² has studied the relation of the appearance of the *tuberculous patient* to the condition of the blood. He gives the findings in 37 cases of early and advanced tuberculosis, which he divides as follows: 1. Early cases (a) paleness (ochrodermia) without anemia; (b) paleness with slight anemia; (c) paleness with anemia (chlorotic type). 2. Chronic cases (d) paleness and anemia; (e) anemia without paleness; (f) paleness without anemia. He shows that one cannot estimate the presence or absence of anemia in a patient by the appearance of the skin or mucous membrane. That these cases should be distinguished, he believes important from the standpoint of treatment. Those of the chlorotic type he finds do better upon iron and arsenic in addition to the general hygienic treatment. In the oligemia of chronic tuberculosis he believes the injection of artificial sera is indicated in addition to the correction of metabolism. In simple paleness the use of iron is not indicated, as it may not do good and may do harm by interfering with digestion.

From the constant attendance of anemic blood changes, especially chloro-anemia, and imperfect chest development, Shurley³ believes these findings indicate a pretuberculous condition. He finds the hypodermic use of green ammoniated citrate of iron in doses of $\frac{5}{1000}$ to $\frac{1}{10}$ of a gram, and sodium arsenate $\frac{1}{1000}$ to $\frac{2}{1000}$ of a gram, gives very good results, the hemoglobin increasing 5 to 10 per cent. per week. The injections were given into the muscles of the back or buttock and were painless. He found that no injury to teeth or stomach and no constipation followed their use. The contra-indications were fever and active hemorrhage.

G. Norsa⁴ found the results of treatment of anemia by means of antibodies to be unpromising in the 4 cases in which he used this means. The benefits were not permanent, the serum causing merely a transient increase in the formed elements of the blood.

Splenic Anemia and Banti's Disease. The varied conditions which are grouped under this head must unfortunately remain in this indefinite state of classification until the etiological factors or the pathogenesis is more thoroughly understood. The clinically distinctive group of cases, classified under the name of "Banti's disease," must

¹ Bulletin of the Lying-in Hospital of New York, June, 1906.

² Revue de médecine, xxvi, No. 3.

³ Journal American Medical Association, June 16, 1906.

⁴ Riforma Medica, xxi, No. 48.

still be considered with the anemias that are accompanied by enlargement of the spleen, at least until the presence of the cirrhosis, which forms an important feature of the syndrome, shall be more definitely shown to be an integral part of the disease, and not simply an accidental concurrent affection. A common tendency seems to be to consider the cirrhosis as being due to the same causative factor as the splenic enlargement. That this does not lead to cirrhosis of the liver in every case is explained by the great difference in the susceptibility of the livers of different individuals to various toxic substances such as alcohol, etc. I have elsewhere stated my belief that the hepatic condition is, at least in certain cases, secondary to the splenic disease.

Schiassi,¹ in a most interesting article, advances a theory as to the etiology of this rather obscure condition. He believes certain individuals are born with distinctly lowered vitality; this is manifested in a lower resistance to infection and in general weakness of the hematopoietic organs. He thinks the original causative agent is bacterial, and that the reason it has never been isolated is that the spleen has never been examined in this condition except years after the beginning of the disease, at which time only the structural changes produced by the invading organism are found and not the germ itself. The result of this change is the increased action of the normal splenic hemolytic ferment (lienase), described by Hedin and Rowland,² on account of the enlargement of the blood spaces in the spleen, the sluggish circulation of the blood in these spaces allowing a more prolonged action of this ferment, and possibly an increased secretion of this hemolytic substance. Under ordinary circumstances this destruction of red cells would be compensated for by the blood-forming organs, but owing to their inherent weakness in these cases they fail to respond and anemia results. He does not agree with Banti that the spleen secretes a toxin which is thrown into the general circulation, and which has an inhibiting action upon blood-forming organs; or with Maragliano, who believes this toxin acts directly upon the corpuscles in the general blood stream; but believes that the destructive action is exerted only within the spleen itself.

The position of Banti's disease as a disease "*sui generis*" is attacked in an article by Souleiman Nouman Bey.³ He gives a *resume* of Banti's original article and then proceeds to describe 3 cases which agree apparently in every particular, even to the blood picture, to the three phases or stages of the disease as described by Banti:

STAGE I. *Stage of Anemia.* Anemia preceded by hypertrophy of the spleen.

STAGE II. *Transitional Stage,* in which the urine diminishes in volume, urates and urobilin are present in abundance, and in certain cases there are traces of biliary pigment.

¹ *Semaine médicale*, vol. xxvi, No. 7.

² *Lancet*, March 9, 1901.

³ *Presse médicale*, xiv, No. 34.

STAGE III. *The Stage of Ascites.* The ascites develops slowly, without pain, and the symptoms of anemia become more marked. Frequently there is present a febrile movement, occurring toward evening. The red corpuscles and hemoglobin are diminished; the white corpuscles, on the contrary, increase in numbers. This last stage has a duration of five to seven months, and may extend, although the case is rare, even to one year, death then taking place.

He reports 3 cases, 2 corresponding to the first stage and 1 to the third stage:

CASE 1.—In his first case he found hypertrophy of the spleen, the organ extending to the umbilical line and to the iliac fossa. The liver was hypertrophied, extending five fingers' breadth below the costal margin. There was no ascites.

Blood findings showed: Hemoglobin, 41 per cent. (Fleischl); red corpuscles, 2,400,000; white corpuscles, 5550. Stained specimen showed nothing of importance.

CASE 2.—The spleen was very large, while the liver was not hypertrophied. Ascites was present.

Blood findings showed: Hemoglobin, 49 per cent.; red corpuscles, 2,800,000; white corpuscles, 6500; malarial plasmodia found in the stained specimens.

CASE 3.—In this case the spleen did not present so much enlargement as in the preceding case, and he noted the absence of either atrophy or hypertrophy of the liver. Ascites was also absent.

Blood findings showed: Hemoglobin, 36 per cent.; red corpuscles, 1,600,000; white corpuscles, 6000; nothing special in the stained specimen.

All the cases gave a history of malaria within the few preceding years, and they all responded quickly to the hypodermic injections of quinine and "arrhenal." The hemoglobin and red corpuscles increased, and the splenic enlargement, ascites, etc. all cleared up. He concludes, therefore, that malaria is the cause of Banti's disease. That malaria may cause conditions resembling not only splenic anemia but also Banti's disease is not to be disputed. That anyone should conclude from a few cases of chronic malaria resembling these conditions that all cases can be ascribed to this etiological factor is entirely unwarranted. Caillaud and Whitacre have both described cases during the last year in which malaria could be absolutely excluded.

Einhorn,¹ after giving a *resume* of the recent articles on this subject, tabulates 18 cases of his own. These he has grouped under three headings:

1. *Pure Form:* showing splenomegaly, anemia, cirrhosis, and ascites.

Reports 7 cases: 4 fatal, 2 result unknown, 1 unfavorable, still under treatment.

¹ Medical Record, September 1, 1906.

2. *Hemorrhagic Form*: having in addition to the above symptoms gastric and intestinal hemorrhages.

Reports 3 cases, all fatal.

3. *Splenomegaly*, enlargement of liver, anemia, sometimes associated with grave gastric symptoms.

Reports 8 cases; 3 cured, 1 result unknown, 3 improved, 1 improved for three years and then died.

He finds cases in group 3 most amenable to treatment. This group resembles hypertrophic cirrhosis of the liver, but he has grouped them with the other cases on account of the anemia and enlargement of the spleen. "Cured" cases of splenic anemia must, in the present state of knowledge, be regarded as doubtful.

Caillaud¹ adds another case to the collected statistics in regard to the pathological anatomy of this condition. He describes a case, terminating fatally, of ten years' duration, the clinical history and course of the disease being typical. The anatomical findings were characteristic, corresponding to the findings of Banti. The following were the most important conditions found:

The *liver* was of almost normal size and appearance. It was somewhat atrophied and the surface was slightly granular. Microscopically it showed abnormal development of the connective tissue, its distribution was not regular, and it did not follow the normal type. The ordinary arrangement of the lobules did not exist. The *spleen* presented the changes as described by Banti. In the pulp was observed here and there an abnormal development of fibrous tissue, which was replaced at the end of the filaments by a reticulum. The meshes formed by this reticulum were not completely filled by cells; those present were grouped around the circumference of the spaces. Around the arterioles he noted a development of connective tissue which compressed the walls of the vessels. Finally he found the nodules of rounded outline, formed by an elaborate fibrillary tissue containing a few cells having a fusiform nucleus, some of which enclose a small narrow opening, vestiges probably of a bloodvessel. These nodules correspond absolutely to the transformation of the Malpighian bodies as originally described.

TREATMENT. *Splenectomy* is perhaps the most commonly employed procedure in the treatment of this condition; at least, it is the one receiving the most attention. The mortality from this operation still remains high. Armstrong² has collected a series of reports of 32 cases, including 1 of his own, in which there were 23 recoveries and 9 deaths. The great danger in these cases is largely from hemorrhage on account of the numerous adhesions. This danger is greatly increased by the tendency to hemorrhage which so many of these cases have. Thus in a case reported by Whitacre,³ in which this tendency to bleeding, as manifested

¹ Presse médicale, xiv, No. 70. ² British Medical Journal, November 10, 1906.

³ Lancet-Clinic, Cincinnati, September 1, 1906.

by hematemesis, epistaxis, etc., was a prominent feature of the case, splenectomy was followed by practically uncontrollable hemorrhage. The patient died eight days after the operation.

Schiassi¹ thinks splenectomy has not proved as satisfactory in practice as was expected. Basing his opinion upon his theory in regard to the causation of the disease, as described above, he believes splenectomy is not indicated in this condition. He believes a more rational procedure is the producing of a connective-tissue capsule around the spleen, and thus diminishing the amount of blood circulating sluggishly in the enlarged blood spaces of that organ. This he accomplishes by scraping the surface of the spleen and surrounding it with strips of iodoform gauze. These are removed five or six days after the operation, one strip each day until they are all removed, the external wound then being closed. He has tried this procedure in 2 cases of splenic anemia with the most happy results, though he does not think this would be sufficient in Banti's disease. In the latter the operation should be supplemented by omentopexy on account of the ascites present. A case of this kind operated upon by the writer four years previously was still in fairly good health. He lays great stress upon the importance of fresh bone-marrow, rest in bed, and abundant feeding in the treatment of these cases subsequent to operation.

In the stage of anemia Einhorn recommends the use of *x*-rays, although he states the consensus of opinion among the writers on this subject seems to be entirely for extirpation even in the early stages. Other cases reported are by Jellineck² and Schauta,³ although the true nature of the case described by the latter is somewhat obscure. The chief interest in the case is due to the fact that splenectomy was performed in a pregnant woman without interrupting gestation.

The changes in the blood following splenectomy in Banti's disease are described in detail by Bierring and Egdhal.⁴ They give a series of seventeen counts, extending over a period of eighteen months, the result of which is as follows: "Summarizing the results obtained in the study of the blood in our patient, we have: first, before operation, blood characterized by anemia of secondary type, low per cent. of hemoglobin, and leukopenia; second, after splenectomy, a slight fall in red cells, then a rise, a leukocytosis reaching its maximum twelve days after operation and characterized by a relative increase in the mononuclear leukocytes, especially the large mononuclears; third, the absence of myelocytes and the scarcity of nucleated red, both before and after splenectomy."

This case followed the usual course in showing a leukocytosis after splenectomy, but the customary lymphocytosis was not so marked,

¹ Loc. cit.

² Journal American Medical Association, July 28, 1906.

³ Zeitschrift f. Gynäkologie, 1906, Nr. 25.

⁴ Journal of the American Medical Association, October 13, 1906.

being chiefly an increase in the large mononuclears. They are led to the belief after studying the blood, in splenic anemia and Banti's disease both before and after splenectomy, that the blood-forming organs are particularly concerned in neither condition, the blood picture in both affections after splenectomy being practically the same.

A fact that seems important was observed in one of my cases, viz., the similarity of the blood picture before and after splenectomy and a brief period of alteration immediately following operation. The failure of any progressive change seemed to be due to the fact that through destructive disease of the organ its function had been as completely destroyed while it remained in the body as after its removal.

Chronic Polycythemia with Enlarged Spleen. Since the article by Osler in 1903 on this subject, much interest has been manifested in the study of this peculiar condition. Each year one finds a few new cases added to the list of those reported; and something is added to our general knowledge of the disease without clearing up entirely the obscure question as to the primary cause of the condition.

THE SYMPTOMATOLOGY AND COURSE are fairly constant, with cases occasionally showing variation in some of the non-essential features. It occurs about equally in both sexes, perhaps slightly more frequently in males than in females, usually toward middle life (forty to sixty years, although instances have been reported of young adults. Its onset is usually slow and insidious and gradually progressive, the early symptoms of headache, dizziness, weakness, cyanosis, and pain in the region of the spleen increasing in severity. Mental torpor and occasional hemorrhages have been noted. On examination one finds cyanosis, an enlarged spleen, with localized pain and tenderness in this region, and occasionally enlargement of the liver. The heart is frequently enlarged; the pulse is not markedly rapid, but full and tense; and the blood pressure is high. The examination of the eye-grounds shows the retinal vessels engorged. The urine usually contains a small amount of albumin and is highly colored; these symptoms being associated with perhaps the most striking feature of all, namely, polycythemia.

The course of the disease is chronic, averaging about six to eight years in duration, but the tendency is always toward a fatal termination, with occasional remissions of the symptoms. The symptoms and general clinical features are described in detail, together with the reported cases by Engelbach and Brown,¹ Cheinisse², J. H. Watson,³ and Köster.⁴

The symptom-complex, as pictured in the original title, "chronic polycythemia with splenic tumor and cyanosis," describes the condition completely as it is usually met; the *cyanosis*, however, is by no means

¹ Journal of the American Medical Association, October 20, 1906.

² Semaine médicale, xxvi, No. 35.

³ Liverpool Medico-Chirurgical Journal, July, 1906.

⁴ Münchener medizinische Wochenschrift, liii, Nr. 23.

constant and is at present usually omitted from the title. Thus Lommel's¹ case presented a ruddy or "overheated" appearance rather than cyanosis. On the other hand, Kraus² reported a case in which the cyanosis extended over the entire body.

That the cyanosis in this condition is not due to the same cause as that in chronic cardiac disease, etc., is shown by Bence.³ This he attempts to demonstrate by the fact that the freezing point of the blood in this condition is normal or subnormal, which is entirely against a carbonic acid gas accumulation in the blood. He agrees with former observers that it is due to engorgement of the superficial vessels, as a part of the general engorgement of the entire vascular system caused by the great overproduction of red corpuscles. He also excluded, by means of chemical and spectroscopic tests, the possibility of its being due to carbon monoxide or change in the hemoglobin itself.

The *polycythemia* is acknowledged by everyone to be due to an actual increase in the number of corpuscles, a true plethora, and not merely to a concentration of the blood. Bence⁴ confirms this view by experiments which demonstrate that in the blood of these cases, as shown by its refractive coefficient and its degree of density to light transmission being near the minimum normal, there is no concentration of the serum, but a true excess of cellular elements. Senator⁵ points out the fact that the high specific gravity and viscosity in these cases are due to an increase in the number of corpuscles alone, and not to any change in the serum, which is usually below normal in its albumin content and molecular concentration. He also gives the results of careful studies of metabolism in 2 cases, especially in regard to the respiratory function. True plethora may be due to one of two factors, either an overproduction of corpuscles or a diminished destruction of the same. No evidence has yet been produced to indicate that the latter process plays any part in the plethora of this condition; every finding points to the overproduction as the causative factor. The red (hyperplastic) bone-marrow, the presence of myelocytes in the circulatory blood, the tendency to an increase in the number of the leukocytes, and the occasional finding of nucleated red corpuscles, all indicated that the bone-marrow is overactive in its productive, especially its erythroblastic, function. The finding by Abeles⁶ of increased iron excretion in the urine, which can only be due to an increased destruction of red corpuscles or hemoglobin, tends to confirm this view.

The cause of this overproduction of corpuscles is not clear, and upon this point there is a great diversity of opinion. Many writers look upon

¹ Deutsches Archiv f. klinische Medizin, lxxxvii, Nrs. 3 und 4.

² Berliner klinische Wochenschrift, March 13, 1905, p. 307

³ Deutsches Medizinische Wochenschrift, xxxii, Nrs. 36 und 37.

⁴ Loc. cit.

⁵ Zeitschrift f. klinische Medizin, Band lx, Heft 5 und 6.

⁶ Zeitschrift f. klinische Medizin, 1906, Band lix.

it as a primary disease of the bone-marrow itself; others consider it merely secondary to some other condition, the nature of which is still undetermined. Lommel¹ holds the latter view, maintaining that the primary cause is in the nature of some disturbance to the general circulation. He attempts to show that it is not primary in the bone-marrow by citing the fact that the polycythemia of chronic heart disease and that met with in people in high altitudes is accompanied by changes in the bone-marrow similar to that found in this condition. The case he reports in support of this view had a long-standing obstruction to the portal system and presented clinically all the characteristics, except cyanosis, of this symptom-complex, even to the hyperplasia of the bone-marrow as found at autopsy. It is interesting to note that, although this case showed marked increase in the viscosity of the blood, there was no sign of cardiac hypertrophy, which is usually present under such circumstances.

The *blood* gives very characteristic and fairly constant findings in all the cases reported during the past year. The erythrocytes are much increased, averaging about 9,000,000, the highest number recorded being 11,150,000; nucleated erythrocytes and normoblasts were found in half the cases, but were very few in number; there was no change in the size or shape of the old cells in the majority of the cases, only a very few showing anisocytosis, poikilocytosis, or polychromatophilia. The hemoglobin varied between 110 and 200, usually about 125, the color index being usually one or slightly below. The specific gravity of the blood varied between 1057 and 1075, usually being found to be about 1070. The viscosity was usually twice the normal, ranging between 10.9 and 11.8. Bence, however, found it three or four times the normal figure. The leukocytes varied greatly in their total number, 5600 and 17,160 being the extremes; the average number was 9960. The neutrophils were found to have either a normal or an increased relative value; myelocytes were present in about one-third of the cases.

The *splenic enlargement*, although a constant feature in all of the cases, is never extreme. Just what its significance is in these cases is absolutely unknown. We know so little in regard to its function that the theories as to its role are almost entirely hypothetical. With the exception of the cases in which primary tuberculosis was present in this organ, splenectomy has been without any effect on the progress of the disease; which would seem to indicate that it bore no very distinct relation to its etiology.

Reissman² describes a case of chronic cyanosis with polycythemia without splenic enlargement. The clinical course of his case was so at variance with the symptom-complex just considered, it can hardly be accepted as bearing any relation to this condition.

¹ Loc. cit.

² Australasian Medical Gazette, October 20, 1906.

PATHOLOGICAL ANATOMY. In the past, several cases have been reported as associated with primary tuberculosis of the spleen. None of the more recent cases which have come to autopsy have shown this condition. Hutchison and Miller,¹ however, report the finding of numerous infarcts in the spleen of a case studied by them. These infarcts showed marked softening in the central portion, which under the microscope could not be absolutely distinguished from tuberculosis, although no tubercle bacilli were found on careful examination. The spleen showed nothing to indicate either excessive blood function or destruction. The marrow was deep red and pulpy. On microscopic examination the most noteworthy feature was the dilatation of the thin-walled bloodvessels, engorged with red corpuscles, without any hemorrhages. The cell most frequently found was the large mononuclear basophile myelocyte, although neutrophile myelocytes and polymorphonuclear leukocytes were fairly numerous. Here and there erythroblastic foci were found, generally small, with an occasional large clump of nucleated reds, the cells of which frequently presented a broken-up nucleus or an appearance of budding. They state that one could not conclude from the study of one section that the erythroblastic function of the marrow was increased; but on taking into account the vast amount of marrow tissue showing this change, one might infer that the polycythemia was due to overformation of red cells. Lommel² also reports the autopsy findings in his case, in which the bone-marrow was similar to the above. It also showed marked interference to the portal circulation, with tortuosity and distention of the veins.

THE TREATMENT is purely symptomatic. The measure which seems to be of most value is blood-letting, although its beneficial effect is only transitory and in no way arrests the progress of the disease. Bence³ applied this method of treatment, withdrawing blood from the vein at frequent intervals, each venesection being followed by relief of headache and dizziness. He also found inhalations of oxygen gave a great deal of relief from the same distressing symptoms. Fluid or semifluid diet in his cases gave him the best results. Different observers have seen occasional good results from the use of arsenic, quinine, and the nitrites.

The *x*-rays have been used without any apparent effect either clinically or in the blood picture.

Hirschfeld⁴ advises the use of potassium iodide on account of its known property of reducing the viscosity of the blood.

Pancoast⁵ has reported 1 case which I sent to him for *x*-ray treatment. The result was on the whole unsatisfactory. He refers to 2 other cases reported in the literature.

¹ *Lancet*, March 17, 1906.

² *Loc. cit.*

³ *Loc. cit.*

⁴ *Therapie der Gegenwart*, xlvii, Nr. 8, p. 359.

⁵ *University of Pennsylvania Medical Bulletin*, January, 1907.

Leukemia. The chief interest in this disease continues to centre in the study of the effect of the x-rays on these cases. In a condition which, heretofore, has resisted nearly every form of therapy employed, any measure that promises relief of any kind is deserving of the most careful and painstaking study. The acute form of leukemia has also received considerable attention.

ACUTE MYELOID LEUKEMIA. The chief question of importance in this condition is whether our present classification of the various forms of leukemias and anemias is on a rational basis. It does not appear wise, in view of our present knowledge, or lack of knowledge, of the etiology and pathogenesis of these conditions, even to consider changing the present method of classification. There are so many cases reported from year to year that are impossible to group according to our present classification, that this question is forced to our attention.

During the past year Ewald¹ reports a case of rather unusual interest in this regard. The patient, a man aged thirty-seven years, entered the hospital after six weeks' illness, with marked anemia, a much enlarged spleen, and no glandular enlargement. Death occurred six days after he was admitted. The history and examination suggested leukemia, but the most careful blood examinations failed to show any of the characteristics of the disease. The blood showed no change except a marked reduction in the red corpuscles and hemoglobin, the former averaging 740,500 per cubic millimeter. The leukocytes were not increased in number and gave the following percentages: polymorphonuclear cells, 71 per cent.; large lymphocytes, 2 per cent.; small lymphocytes, 21 per cent.; myelocytes, 3 per cent.; transitionals, 3 per cent.; eosinophiles, absent. The autopsy showed the typical anatomical picture of leukemia, with characteristic changes in the marrow and organs. He excluded the possibility of a suppression of the leukemic blood picture by an intercurrent affection, as the blood had been examined two weeks previously in another clinic, at which time it showed no change. An aleukemic period has been described in cases of leukemia, but this case cannot be considered in that regard, as the leukemic blood picture never arrived. It cannot be grouped under any of the present forms of anemia, as it had none of the characteristics of any of them. It is altogether a very atypical form.

Joachim² reports 2 cases, in detail, of what he calls "*mast-cell leukemia*," which he considers a form of myeloid leukemia. The blood was characteristic of leukemia, with a very high percentage of mast-cells, reaching 56.4 per cent. in 1 case and 53.6 per cent. in the other. Myelocytes were also very numerous, especially in case No. 1. The autopsy showed a bone-marrow not typical of either myeloid or lym-

¹ Berliner klinische Wochenschrift, xliii, Nrs. 25 und 26.

² Deutsches Archiv f. klinische Medizin, lxxxvii, Nrs. 5 und 6.

phatic leukemia, but a combination of both, with grayish infiltration of various organs. The bone-marrow showed an enormous number of mast-cells, completely overshadowing every other form of cell. It has been observed frequently that the leukemic blood picture and the patient's general condition have been greatly improved at times by the presence of some intercurrent affection. A case demonstrating this phenomenon is reported by Funck.¹ It was a case of myelogenous leukemia, which, while under observation, developed a hydronephrosis with definite signs of infection. The day after infection the spleen decreased two fingers' breadth in size, and the swollen glands became almost impalpable. During the infection the blood picture improved, the number of leukocytes falling from 36,800 to 4200 in four days, and gradually rising again to 10,000 and then to 13,000. The neutrophiles fell from 98 per cent. to 18 per cent. The Arneth "neutrophile blood picture," which had been well to the right, gradually shifted, after the infection, to the left. Four days after the beginning of the infection there were 100 per cent. in Class I, which persisted for three days, then gradually returned to the right, but not to such a marked degree as before the infection.

Sternberg² has studied the spleen in 23 cases of infection with acute splenic tumor, and in all cases single neuclear neutrophile leukocytes, myelocytes in the sense of Ehrlich, were found. He believes that a true myelogenous metamorphosis takes place under the effect of toxic substances, and that the myelocytes originate under these conditions in the spleen. As in none of the cases did examination of the blood reveal myelocytes he thinks these cells could not have been carried to the spleen by the circulation. He believes the change is similar to the changes in the bone-marrow in leukemia, and that it is a true hyperplastic process.

That the blood of leukemic patients contains a *trypsin-like ferment* has been previously pointed out by Erben. Schumm,³ in studying the chemistry of the leukemic blood, has also called attention to this albumin-splitting ferment resembling trypsin, in cases of myelogenous leukemia. The method of examining the blood for the presence of this ferment has been described by Müller and Jochmann,⁴ who used plates of coagulated cattle-blood serum. They found that blood from myelogenous leukemia cases softens or digests the medium, whereas blood from cases of lymphatic leukemia has no effect upon it. In a later paper Jochmann and Ziegler⁵ report their studies of this leukocytic ferment found in the spleen, lymph glands, and bone-marrow in leukemia and pseudoleukemia. They found in leukemia that the lymph glands showed this

¹ Berliner klinische Wochenschrift, xliii, Nr. 40.

² Centralblatt f. Allgemeine Pathologie und pathologische Anatomie, xvi, p. 929.

³ Deutsche medizinische Wochenschrift, xxxi, Nr. 6.

⁴ Münchener medizinische Wochenschrift, liii, Nr. 29.

⁵ Ibid., Nr. 43.

digestive power in direct proportion to their myeloid metamorphosis. In myelogenous leukemia they could even estimate the degree of myeloid transformation in a gland by the degree of digestive power. The organs of 1 case showed this digestive power intact after they had been submerged in formalin solution for seven months. The organs from the cases of lymphatic leukemia showed a very marked difference; here there was no digestion produced by portions of the enlarged spleen or lymph glands, and the bone-marrow also showed this power to be very much reduced. In normal man the bone-marrow was strongly digestive, the spleen less so, and the lymph glands not at all. Organs from cases of pseudoleukemia gave results practically the same as normal. All their experiments were very carefully controlled.

CHRONIC LYMPHATIC LEUKEMIA. The same confusion as to the exact classification of a case occasionally arises in those which are grouped under this heading as is found in the myelogenous cases. Cases are not infrequently met with in which it is difficult to say whether they belong to the lymphatic or myelogenous leukemia. This is well illustrated by a case reported by Findlay¹ which he calls a case of "mixed-celled leukemia." The patient, a boy of eleven years, had been sick six weeks, suffering with sore throat and petechia. There was no enlargement of spleen or liver, and only a slight enlargement of the lymph glands. The examination of the blood showed a very large proportion of neutrophile myelocytes, 39 per cent.; it also showed a great many large lymphocytes, 35 per cent. From a study of the organs obtained at autopsy the author considered it a case of myelogenous and lymphatic leukemia. Preiss² reports 2 cases of atypical leukemia, 1 of which showed blood findings with a mixture of the characteristics of lymphatic and myeloid leukemia. The anemic features with a large number of nucleated red cells was a very striking finding in the case. The second one also showed a blending of anemic and leukemic features of the blood, although the former were not so marked as in the first case. He regarded this case as one of lymphadenoid splenic pseudoleukemia at first, with a gradual formation of lymphomas in the liver and bone-marrow, and possibly a transformation of the disease into lymphatic leukemia. He remarks that the process under which, now one and now the other, group of cells is thrown into the circulation is not known. At any rate, it seems that the appearance of atypical leukemia has to do with a similar reaction process at the site of the productive myeloid tissue, as a result of the lymphatic metaplasia and hyperplasia of the bone-marrow.

Whitney³ reports 2 cases with some interesting features. The first was a case of the "large-celled" variety of lymphatic leukemia, which cell he believes is more nearly related to the myelocytes than to the

¹ Glasgow Medical Journal, October, 1906.

² Zeitschrift f. klinische Medizin, lvii, Nrs. 5 und 6.

³ Boston Medical and Surgical Journal, September 20, 1906.

lymphocytes. In his descriptions he calls them large basophiles. He gives clinical and autopsy findings in detail. He believes that in this case the leukemic process was due primarily to a pathological condition in the bone-marrow, with a secondary involvement of the other organs. For this reason he thinks it should be classified as a myelogenous leukemia, although the blood findings require its being classed as a lymphatic leukemia. The case showed, both clinically and at autopsy, a complete absence of enlargement of the lymphatic apparatus, which is demanded by the classical picture of lymphatic leukemia as described by Ehrlich. The case was also interesting in that it showed a most remarkable rapidity in the increase in the leukocytes; on one occasion they increased nearly 200,000 in twenty-four hours. The second case was of interest chiefly because of the fact that, while under observation for a long period of time, the leukocytes never went above 10,700, although during that period the lymphocytes formed about 90 per cent. of the leukocytes. At one time the number of lymphocytes—which he calls basophiles—became gradually lower and almost approached the normal figure for a child of her age.

LeBoutillier¹ reports the clinical findings in a child between ten and eleven years of age in whom the symptoms resembled those of Hodgkin's disease. The diagnosis of chronic lymphatic leukemia was easily determined by an examination of the blood.

ACUTE LYMPHATIC LEUKEMIA. This condition has attracted considerable attention during the past few years. Its manifestations, both clinically and pathologically, are of such a peculiar and characteristic nature, that it seems to offer special attraction for the investigator. The disease usually occurs in young people, quite commonly in children, although it is occasionally found affecting those more advanced in years. The premonitory symptoms are vague and by no means characteristic. The onset of the typical symptoms is usually in a manner closely resembling that of the acute infections. This resemblance is frequently very striking, being manifested by chills, rapid rise of temperature, accelerated pulse, vomiting, diarrhea, diminished urinary secretion, depression, dyspnea, glandular enlargement, progressive anemia, general weakness, and hemorrhages—often in the form of purpura. This similarity to the acute infections is well illustrated by a case reported by Marvel.² The first symptom noted is not infrequently tonsillitis, which may be severe or mild in character; but it is almost invariably present at some time during the course of the disease.

Bailey,³ in studying the cases of acute leukemia admitted into St. George's Hospital between 1895 and 1905, found the tonsils involved in 4 of the 5 cases. This tonsillar involvement may be of such a character

¹ Archives of Pediatrics, July, 1906.

² Journal of the American Medical Association, August 18, 1906.

³ Lancet, December 15, 1906.

as to suggest diphtheria: at least, not infrequently one meets with the statement, in the report of cases, that the culture for the detection of diphtheria proved negative. Occasionally the stomatitis, which is of frequent occurrence, may so overshadow the tonsillar condition as to suggest scurvy. In fact, certain writers recognize a "pseudoscorbutic" type of this disease. A case of this type is reported by Meyers.¹

The glandular enlargement is usually first noted in the cervical region, the glands of the axilla and groin becoming enlarged subsequently. However, the enlargement may affect all the lymphatic glands simultaneously, the degree of enlargement varying considerably in different cases. Purpura with the hemorrhagic tendency usually occurs later in the disease. There is considerable discussion as to whether this disease is really an infection, or whether it is to be considered more in the nature of a new-growth. Veszpremi² believes that, although it can hardly be considered a true tumor, it has certain features resembling a new-growth. In studying 3 cases of the large-cell type, he found the bone-marrow especially affected, and considers this organ to be the original seat of the disease. The proliferating cell, which he looks upon as an immature lymphocyte, is one peculiar to the bone-marrow. It is this cell which proliferates, and the cell elements, being cast into the blood current, are carried to the various organs, where they produce other cells, thus forming secondary, tumor-like growths. Schultze³ also believes that the tumor theory is the more probable explanation of the nature of this disease.

The malignant course, the absolutely fatal termination in all cases, the tumor-like proliferation in the most diverse organs, and the extension of the proliferation beyond the normal bounds of the organ involved (frequently shown microscopically in cases), all show a similarity to the sarcomatous new-growths. In spite of numerous experiments made by observers in attempting inoculative experiments with the blood and organs of these cases, thus far, we have no definite parasitic factor which seems to bear any constant relation to the disease. The majority of the examinations show a sterile condition of the blood in uncomplicated cases. The various bacteriological findings which have been recorded, Schultze thinks, can be attributed to secondary or terminal infections.

Edsall⁴ reports a case of acute lymphatic leukemia in which he discusses certain disturbances of *metabolism in leukemia*, which he considers are of much clinical and pathological importance, particularly in their relation to the hemorrhage that occurs in this disease. In his

¹ Interstate Medical Journal, May, 1906.

² Virchow's Archiv, clxxxiv, Nr. 2, p. 220.

³ Beiträge zur pathologischen Anatomie und allgemeine Pathologie, Ziegler, Band xxx, Heft 2.

⁴ American Journal of Medical Sciences, October, 1905

case the possibility that the disease had originated from mouth infection, set up through the extraction of a tooth, he dismisses as extremely improbable. The early appearance of severe stomatitis in many cases has led to the repeated suggestion that the disease itself is caused by infection, particularly through the diseased mouth. In the instance that he describes, however, the actual conditions were the reverse of this; that is, the disease itself evidently produced the symptoms that led to the extraction of the tooth.

Edsall thinks there is, in the writings dealing with acute leukemia, little if any discussion of the possibility of mistaking this disease for diphtheria or simple angina Ludovici. Late in this case it would have been wholly impossible, without bacteriological investigation, to have stated that it was not diphtheria; and angina Ludovici seemed, when he first saw the man, to be probably the main condition present. The blood examination showed at once that he had acute leukemia. The blood count showed 466,640 leukocytes; 1,820,000 red cells. The hemoglobin estimations at this time and subsequently were unreliable, because of the immediate clouding that took place. The examination of stained specimens showed a very definite but somewhat peculiar picture of acute lymphatic leukemia.

Edsall describes the clinical findings in detail, also the results of the metabolism experiment. In regard to the latter he states that the balance between the intake of nitrogen and the outgo in the urine alone showed a loss of 22.28 grams, and with the loss from other sources he must, in all, have had a negative nitrogen balance during this twenty-four hours of as much as 27 grams. The loss of phosphorus, while decided, was not so remarkable as the loss of nitrogen. It was probably, however, over 2 grams. Such tremendous tissue destruction is a condition that is comparatively rare in other diseases, but it seems to be very common in acute leukemia, as far as the investigations on record indicate. It appears to be a very important element in the pathology of the condition. Magnus-Levy directed attention to this very remarkable disturbance of metabolism, reaching the conclusion that a large part of the tissue destruction in acute leukemia is probably dependent upon the hemorrhages that occur in this disease. This seems to Edsall to be very questionable. Magnus-Levy's work and that to which he refers have shown that hemorrhagic conditions are often associated with a marked nitrogen loss, and it is not improbable that a small amount of tissue destruction is dependent upon the hemorrhage itself. The experimental work of Hawk and Gies shows that the mere hemorrhage does produce some tissue destruction. But in such experimental work, in which other abnormalities are not present, hemorrhage seems to cause but slight disorder of general metabolism, and hence it would appear to be an insufficient explanation of the extremely unusual conditions found in acute leukemia. Therefore,

since very severe abnormalities besides the hemorrhage are present in acute leukemia, it seems that hemorrhage offers a very incomplete explanation of the metabolic disturbance in this disease. Violent acute disturbance of metabolism is usually due to some form of toxemia; and Edsall believes that the hemorrhage and the disorder of metabolism are due to a common cause, probably a toxemia.

The blood picture in these cases is very typical, forming an absolutely conclusive diagnostic point. There is nothing with which it can be confused. Unfortunately this typical picture sometimes may not develop in the early stage of the disease, as in the case reported by Marvel. One usually finds evidence of a secondary anemia which becomes more marked as the disease progresses. The number of red corpuscles may be very low, even 1,000,000 or less having been reported. Occasionally normoblasts are present. The hemoglobin varies greatly. The white corpuscles are very much increased, usually between 50,000 and 200,000, although cases are on record in which they numbered over 700,000. The picture so far might apply to any of the leukemias, but in the study of the stained film one finds the most characteristic feature of the entire process. The lymphocytes are relatively enormously increased, forming 90 to 97 per cent. of all the leukocytes. They are different from the lymphocytes as seen in the chronic lymphatic leukemia, in that, at times, they are almost entirely (90 per cent.) composed of the large and not the small lymphocytes, as is the case in the chronic form. Occasionally neutrophile myelocytes have been recorded in these cases; but, when present, they are very few in number and are by no means constant.

Auer¹ reports the finding of peculiar refractile, rounded or rod-like bodies in the cytoplasm of the large lymphocytes in this condition. In the nuclei of nearly all the large lymphocytes he noted a number of contractile, pulsating, clear areas, and in one instance he observed the same phenomenon in the cytoplasm. He gives the staining reactions of these structures, but could come to no definite conclusion as to their significance or nature. He discusses the possibility of their being artefacts; cell constituents, such as nuclear metabolic products, nuclear degeneration or granulation; or parasites. On account of their close resemblance, he considers the possibility of their connection with the Leishmann-Donovan bodies. He believes they may be identical with the bodies described by Mannaberg in 1896.

The *treatment* is purely symptomatic, as there is no specific line of treatment known. Drugs appear to have no value whatever in retarding the fatal issue. The cases are invariably fatal, the disease usually lasting from a few weeks to a few months. Bailey,² looking upon the disease as an infection, administered to one of his patients an intravenous injection of formalin in normal salt solution, 1 part of the former in 5000

¹ American Journal of Medical Sciences, June, 1906.

² Lancet, December 15, 1906.

parts of the latter. He gave 40 c.c. of this mixture every second day. The leukocytes fell over 300,000 in eleven days under this treatment; however, he declines to attribute this decrease in the number of leukocytes to the injections.

TREATMENT OF LEUKEMIA. Richardson¹ records a case of myelogenous leukemia in which splenectomy was performed in 1901, with a return of the blood to normal after the operation. The patient remained well for three years, when typical symptoms of locomotor ataxia set in, and he died. The author does not believe that the extirpation of the spleen had any effect upon the course of the disease. He reports the case chiefly because it has been so frequently quoted as a cure of myelogenous leukemia following splenectomy. It must be added that the examinations upon which the diagnosis of leukemia was made were not entirely conclusive. I am unwilling to accept it as established.

That certain cases which do not respond to the x-rays may show a marked benefit from the use of arsenic is shown by 2 cases reported by Grunbaum.² Dickson,³ reports a case which appears to have been an acute or subacute lymphatic leukemia in which he perceived most marked benefit from the use of liquor arsenicalis in 5-minim doses three times a day the dose being gradually increased to 15 minims. The condition improved in three days, and in about two months was apparently perfectly well.

THE X-RAYS IN LEUKEMIA. The literature upon this method is most extensive, and the reports upon cases treated by this procedure are becoming more and more numerous. The early gratifying results have apparently stimulated an enormous amount of interest in the method of treating a condition which has been looked upon previously as almost hopeless.

The *technique* of the administration of the x-rays as employed by various writers is considered by Schirmer⁴ who also gives an extensive review of the literature. He states that the majority of writers used fractional doses and numerous sittings, but that the Vienna school advocated a single complete sitting. Roth⁵ in his case treated the spleen alone at first, and later the spleen and long bones alternately. He used a hard tube, with the area treated placed ten inches from the anode. Each exposure varied from seven to fifteen minutes. DeRenzi⁶ exposed the spleen to the rays for from five to twenty minutes daily for ten days, and then again for ten days after an interval of a few days. The intensity of the exposures corresponded to about eight degrees on the Benoist

¹ Annals of Surgery, November, 1905.

² Practitioner, 1905, No. 450, p. 767.

³ Lancet, August 18, 1906.

⁴ Centralblatt f. der Grenzgebiete der Medizin und Chirurgie, ix, Nrs. 15 und 16.

⁵ Journal of the American Medical Association, October 20, 1906.

⁶ Riforma Medica, xxii, No. 19.

radiochromometer. Aubertin¹ believes the exposures should be given at considerable intervals, and should be regularly and uniformly distributed over the entire blood-forming apparatus. As the blood picture shows signs of improvement the intervals should be lengthened, never pushing the treatment to that degree that the leukocytes fall below the normal number. Maragliano² believes that greater and more rapid effect would be produced by exposing to the rays the neck, where the glands are very numerous, or the liver, where large quantities of blood are found. He also prevents burns by covering the part with four layers of diachylon, which adheres to the skin and shuts out the injurious rays. Cohn³ advises the washing of the skin, followed by an alcohol rub, and a vaselin dressing at night, for the prevention of burns. Pancoast⁴ uses a wet leather filter for the same purpose. As to the value of this means of treatment, a study of the reported cases proves that the majority show that most of the myeloid leukemias manifest improvement, which is, however, as a rule only temporary. Very few cases live over three years, which might be classed as cured. Pancoast⁵ has collected a series of 63 cases, in 23 of which he has a report up to the time of writing. Of these 63 cases only 4, or 6.35 per cent., were alive and well three to six years after symptomatic cure. The lymphatic leukemias do not show such a frequent beneficial effect as do the myeloid cases. Still the measure offers the most beneficial effect of any that are used today in the treatment of leukemia.

Although a study of the effect of the x -rays upon healthy animals most undoubtedly gives us valuable information, it should be remembered that in leukemia we are dealing with a distinctly abnormal condition of the organs and tissues most affected by the rays, and must not accept the results of experimentation on animals as being of necessity applicable to the conditions in leukemia. The animal experimentation has been carried on to determine the exact nature of the action of the x -rays in producing a decrease in the number of leukocytes and improvement of the patient, especially in regard to the retrogressive changes in the enlarged organs. That this is brought about by leukolytic action of the blood serum—that is, the development of a leukotoxin—has been rather conclusively shown by previous writers.

Capps and Smith⁶ have carried out a series of experiments similar to those of Curschmann and Gaupp (as described in the last volume of *PROGRESSIVE MEDICINE*). The conclusions they draw from their experiments are as follows: (1) The x -rays produce in leukemia a disintegration of the leukocytes, affecting especially the young forms, viz., the myelocytes

¹ *Semaine médicale*, xxvi, No. 39.

² *Gazzetta degli Ospedali*, xxvii, No. 134.

³ *Berliner klinische Wochenschrift*, 1905, Nr. 38.

⁴ *University of Pennsylvania Medical Bulletin*, January, 1907.

⁵ *Ibid.*

⁶ *Journal of Experimental Medicine*, January 23, 1907.

and the non-granular mononuclear cells. A similar action, but one of less degree, takes place in leukemic blood exposed to the *x*-rays *in vitro*. (2) The serum of a leukemic patient that has improved under the *x*-ray treatment, when injected into animals, causes leukopenia; when added in the hanging drop to the leukocytes of another individual, it disintegrates the cells. This leukolytic action is selective, destroying first the mononuclear cells. The strength of the leukolytic action seems to be proportionate to the degree of clinical improvement of the patient under the *x*-ray treatment. (3) The serum of a case of leukemia which has been exposed to the *x*-rays has a marked agglutinating action on normal red corpuscles and on other corpuscles. The degree of agglutination varies roughly with the degree of leukolysis present. (4) The *x*-ray treatment of normal or leukemic blood *in vitro* does not materially alter the phagocytic power of the leukocytes. (5) The injection of a strong leukolytic serum from a patient suffering from lymphatic leukemia under *x*-ray treatment into another individual with lymphatic leukemia, not under treatment, caused a decided and rapid fall in the number of leukocytes. The mononuclear cells were principally affected. With repeated injections a partial immunity to the serum was established.

Joachim¹ describes in detail the results of *x*-ray treatment on 10 cases of myeloid leukemia (myelemla), 6 cases of lymphatic leukemia (lymphemia), 1 case of mixed leukemia, 1 case of mast-cell leukemia, and 10 cases of pseudoleukemia. He considers his findings under three headings: (1) The effect of the *x*-rays upon the blood. (2) The effect on the leukemic or pseudoleukemic tumors. (3) The effect on the general condition of the patient. He believes the last (No. 3) gives one of the best indications of the results of the treatment. He says that it cannot be denied that the *x*-rays exert an influence on the blood of the normal living organism, but that it is not certain that the effect is upon the blood itself, as the bone-marrow can never be excluded in the exposures of the living body, no matter what portion may be subjected to the rays. In his investigations all cases of leukemia, either myeloid or lymphatic, showed a reduction in the *total number* of leukocytes. The manner of the reduction varied. Some cases showed a latent period ranging from eight days to five weeks. In the majority (two-thirds) of cases, however, the reduction was immediate. They varied also in the rapidity of the reduction: occasionally it was very rapid (134,000 in twenty-four hours in 1 case); and, on the contrary, it may be so slow that the change from day to day could hardly be noted. There were no definite relations between these different findings except that, as a rule, the higher counts appeared to decline more rapidly, and the latent period in these cases was usually shorter. The more acute the process, the quicker

¹ Zeitschrift f. klinische Medizin, lx, Nrs. 1 und 2.

the reaction, is usually the rule. The cases of relapse were all harder to affect than the "fresh" cases.

In regard to the effect of the x -rays upon different types of leukocytes in *myeloid leukemia*, he believes the rays have an elective action upon the myelocytes. In all of his cases, excepting 2 very irregular and atypical cases, the percentage of myelocytes decreased; in fact, this fall can be accepted as the rule. The degree of the decline varies, some falling to a fraction of 1 per cent.; in others the percentage remained high, although the leukocytes had fallen to leukopenic value. He believes the behavior of the myelocytes is of the greatest prognostic value, much more so than the fall in the total number of leukocytes. The lower the relative myelocytic value, the more hope for the preservation of the patient; the higher the percentage of myelocytes, the more unfavorable is the prognosis. Joachim also noted, in the relapsing cases of myeloid leukemia, that the increase in the percentage of myelocytes preceded the increase in the total number of leukocytes by several days. Because of this he was able to predict the relapse by the study of the myelocytes. The lymphocytes showed a slight rise in percentage under the rays; but never reached the normal, as they are usually quite low in this disease. The other forms of leukocytes varied only slightly. In *lymphatic leukemia*, the lymphocytes showed a relative as well as an absolute decrease under x -ray treatment, but never to so marked a degree as the myelocytes in the myeloid leukemia. The study of the red blood corpuscles in cases of leukemia, he considers of the utmost value, as he found from his investigations that the cure by means of the x -rays depends to a large degree upon the condition of the red blood cells. One case of leukemia showed a normal red blood count; after exposure to the rays there was a slight fall, with a return to normal. All the other cases of myelogenous leukemia showed a red count below normal, usually a distinct anemia. These cases showed two different groups in the effects of the rays upon the red cells; in one group there was a distinct increase in the reds after the exposures; the number even reached normal. These were the more favorable cases in regard to the ultimate result, since all improved after treatment. The second group showed an unfavorable influence even from the beginning of the treatment, so that the symptom-complex became similar to that of pernicious anemia. All those cases showing decrease in the number of the reds died.

In myeloid leukemia all the cases showed a more or less marked decrease in the size of the spleen and lymph glands. In lymphatic leukemia 7 cases showed a distinct and rapid decrease in the size of the lymph glands which unfortunately tended to recur. The general effect in 6 of the cases of myeloid leukemia was very good; in lymphatic leukemia, however, the general effect was not very marked. He believes that one cannot yet speak of a cure, but in many cases there may be obtained a prolongation of life and a return of a general sense of comfort for years. That they do not improve,

and may even injure, some cases is a property which the x -rays hold in common with many other therapeutic measures.

PROGNOSIS. Joachim believes the most important point is the more or less marked anemia and the effect of the raying upon the anemia. Further, in myelemia the resistance of the myelocytes to the treatment is important. Perhaps also those cases of myelemia are unfavorable in which the leukocyte count does not correspond to the size of the splenic tumor. He recommends the x -rays in all cases of leukemia, but it is to be discontinued when the anemia becomes more marked or severe changes in the general condition of the patients occur. These cases may be treated with arsenic, and the x -rays again tried.

That the cases of leukemia under x -ray treatment often terminate in a condition similar to pernicious anemia is shown by 2 cases reported by Wassmuth¹ and Preiss.² It has been suggested by Cohn³ that this may be due to toxins developed by the disease. That the cases tend to show an increase in the red blood cells under x -rays is noted by Becbere⁴ who is very enthusiastic in regard to the beneficial effects of the rays in leukemic conditions.

Another possibility in cases of chronic leukemia is the development of acute leukemia even in the leukopenic stage. Flesch⁵ reports the case of a boy who, while under treatment, and in whom the blood picture had practically returned to normal, suddenly developed symptoms of acute leukemia and died. Ledingham⁶ reports the autopsy findings in a case reported last year.⁷ He thought these might lead one to suspect acute leukemia, though he does not believe that is the case, and explains the findings by the effect of the x -rays upon the myeloid function of the spleen.

Buchanan⁸ holds to the view that the effect of the x -rays in leukemia is twofold: first, by inhibiting overproduction in the marrow, which he believes is shown by the rapid recurrence of the myelocytes when the x -ray treatment is discontinued; and, second, by a destructive action upon the leukocytes themselves. This latter he explains by their diffuse staining properties, which are sharp before the treatment is applied, and by the tendency to fragmentation of the nuclei and cells both in spreads and in the marrow after exposure to the rays.

The immediate effect upon the blood is shown very well by a case reported by Roth.⁹ He found that after exposure to the x -rays (fifteen

¹ Wiener klinisch-therapeutische Wochenschrift, 1905, Nr. 46.

² Zeitschrift f. klinische Medizin, lvii, Nrs. 5 und 6.

³ Berliner klinische Wochenschrift, 1905, Nr. 38.

⁴ Archives d'électricité médicale, 1905, No. 169.

⁵ Jahrbuch f. Kinderheilkunde, 1905, lxii, p. 293.

⁶ Lancet, February 10, 1906.

⁷ PROGRESSIVE MEDICINE, June, 1906, p. 266.

⁸ British Medical Journal, July 14, 1906.

⁹ Journal of the American Medical Association, October 20, 1906.

and thirty minutes) there was a gradual rise in the number of leukocytes which reached its maximum about five hours after the exposure. The degenerated leukocytes were nearly all disintegrating myelocytes, in many cases consisting only of a network of fibrils. The increase in the number of degenerates seemed to be related to the general leukocyte increase after exposure.

The Blood and Blood Diseases of Infants. The study of the blood changes, as exhibited in various blood diseases of infancy, reveals the fact that the ordinary findings in the adult are so modified and altered that the clinical course and symptoms are so irregular that the rules of classification of disease in the adult cannot be employed in studying these conditions. One can but surmise that the peculiarities are due to the fact that at this age we are dealing with developmental conditions and that difficulties of classification will continue until the normal conditions at this age are better understood and more thoroughly studied.

Esser¹ has studied the blood in infants which have been both *naturally and artificially fed*. He uses the method of Arneth and presents the "neutrophile blood picture" in 19 different cases. Arneth's method as usually employed is briefly as follows: He counts 100 polymorphonuclear neutrophile leukocytes, arranging them in five classes according to the number of nuclear divisions. Thus those showing only a single nucleus are placed in Class 1, those with two nuclear divisions in Class 2, and so on up to those having five divisions or over, which are included in Class 5. The percentages are arranged with Class 1, at the extreme left, Class 5 being at the right. In giving the "neutrophile blood picture," as it is called, it is customary to omit the class numbers. This method was described in detail in *PROGRESSIVE MEDICINE*, June 1905, p. 274. He found the average picture in 9 healthy infants, ranging from three weeks to seven months of age, was as follows: 4.5 per cent., 25.5 per cent., 34.5 per cent., 30 per cent., 5.5 per cent. These cases placed on cows' milk diet showed a distinct shifting of the picture toward the left, thus: 12.5 per cent., 42 per cent., 31.5 per cent., 13 per cent., 1 per cent. Where breast milk and cows' milk were both used, very little change from the first-mentioned percentage was noted. 5 cases ranging from five weeks to nine months, fed on artificial mixtures of cows' milk, gave the following average picture: 12.6 per cent., 39 per cent., 36 per cent., 12 per cent., 0.4 per cent., corresponding very closely to the last picture. Where gastro-intestinal diseases were present the picture was much more distinctive; the reversion toward the left was much more marked, presenting a sharp contrast to that of the healthy infants. The average in 3 cases between three and four months old was as follows: 38 per cent., 42.7 per cent., 15.3 per cent., 4 per cent., and no percentage.

Zelenski² also found that the "neutrophile blood picture of Arneth"

¹ Münchener medizinische Wochenschrift, liii, Nr. 34.

² Wiener klinische Wochenschrift, 1906, Nr. 40.

in infants showed, in disease, a tendency toward the left, more or less marked according to the nature of the disease. This tendency was greater in younger children than in older. Occasionally children, who had been apparently healthy, would show this same tendency accompanied by a slight rise of temperature, to account for which no definite lesion could be determined. He believed this could be explained on the ground of some mild local disease in the body not sufficient to cause symptoms.

When we come to study the primary blood diseases, their peculiar irregularity is very well shown in 3 cases reported by Whipham and Leatham.¹ The first 2 cases may be briefly described as follows: The disease came on suddenly in both, with general malaise and glandular involvement in 1 and with purpuric eruption and general constitutional disturbance in the second, the glandular enlargement being discovered later in this second case. In both there was marked diminution in the polymorphonuclear leukocytes and an increase in the mononuclear leukocytes (97 and 98 per cent.), the majority of these being large lymphocytes. There were a few eosinophiles and myelocytes in both. In neither case did the leukocytosis exceed 25,000. The red corpuscles were markedly decreased in both toward the end of the disease, with a small number of normoblasts and degenerative changes. The color index was very slightly below one. They believed these cases to be clinically consistent with acute lymphatic leukemia; early involvement of lymph glands, enlargement of spleen and liver, progressive anemia and cachexia, hemorrhages, followed by early death, marked increase of the lymphocytes, although no very marked leukocytosis existed. The autopsy in Case I showed one very small lymphoid deposit in the liver; this condition was present to a more marked degree in the second. The third case presented many features of pernicious anemia. The anemia was severe, only above 2,000,000 twice in the fourteen months under observation, and it became as low as 774,000 shortly before death, at which time poikilocytosis and anisocytosis were present. Nucleated reds were present in small numbers, and in the last count one megaloblast was found. The color index was high throughout the entire time, averaging 0.78 to 1.25. The leukocyte count was low, 9200 being the highest observed. The spleen was never very large and frequently could not be felt. They believed this case conformed less to splenic anemia than to pernicious anemia, although this latter diagnosis could not be confirmed.

We now come to a consideration of the splenic forms of anemia, which have excited much interest since they were first described, and concerning which there is considerable diversity of opinion. During the past year there have been several contributions upon the subject

¹ *Lancet*, August 11, 1906.

of *anemia pseudoleukemica infantum*, also known as anemia splenica infantum, anemia splenica infettiva dei Bambini, splenomegalie chronique avec anemie et myélemie (forme infantile). It is claimed to be a symptomatic anemia by a great many observers, especially the Italian ones, who believe it to be secondary to toxic infection, frequently of gastrointestinal origin. Fischl also believes it is not a primary disease, as he showed a similar blood finding in cases that had nothing in common with *anemia splenica*, and on the other hand this blood picture was absent in cases presenting the clinical picture of this disease. It must be borne in mind besides that lues, rachitis, tuberculosis, and chronic gastro-intestinal disorders frequently have severe anemia and a splenic tumor in their course.

Lehndorff¹ considers this question at length. He states it has been defined as "unsyndrome intermediaire entre l'anemie simple avec megalosplenie et la leucemie," and as "a midway position between leukemia and pernicious anemia." He reports a child, eighteen months old, that had an enlarged abdomen and pallor since birth. There were no symptoms of lues. Rickets was present, the lymph glands were slightly enlarged, there was a systolic murmur at the apex, the spleen was very much enlarged, the liver was also enlarged, and there were subcutaneous hemorrhages and epistaxis. The child died of bronchitis and lobular pneumonia. Examination for tubercle bacilli was negative. The blood count was as follows: Very severe oligochromemia (from 25 per cent. as low as 10 per cent.); marked oligocythemia (1,610,000, to 670,000); the whites varied between 20,000 and 40,000. There was a great increase of transitionals and large mononuclears. Myelocytes were present and numerous nucleated red corpuscles. At autopsy he found, in the liver and kidneys, areas which showed the microscopic picture as found in myelemia. The lymph glands and spleen were much less affected. There was a remarkable absence of pigment and siderosis. The blood picture in this condition, he sums up as follows: severe anemia; a moderate number of nucleated reds, especially megaloblasts; karyokinesis; polymorphonuclear leukocytosis of moderate grade, with a variable percentage of neutrophile myelocytes. He believes an unknown destructive agent, although it is not known whether or even to what extent severe rickets, hereditary syphilis, etc., may be considered as etiological factors, brings about an almost complete breaking up of the hematopoietic apparatus, the presence of myeloid foci in different organs being accounted for as a reaction against this destructive process. It may be that v. Jaksch's "*anemia pseudoleukemica infantum*" is nothing else than the type of myeloid leukemia whose clinical course and pathological anatomy appear to be modified by the anatomical peculiarities of the nursing age, and

¹ Jahrbuch f. Kinderheilkunde, Band lx.

perhaps also the diseases accompanying that period. However, he believes that many cases are described under this title which have really nothing to do with the disease, thus leading to considerable confusion.

In relation to the pathological findings in this case, it is of interest to refer to the article by Swart.¹ In 4 cases ranging from the newborn to those fifteen months of age, with similar clinical histories, he found evidences of pathological blood formation. They all showed considerable anemia, marked enlargement of the liver and spleen, and 2 of the cases, marked ascites. The liver in all 4 cases showed an unterminated development of the organ, inasmuch as extensive hematopoietic function could still be determined in the vascular system, which is no longer to be found normally in the liver. The blood formation in the vessels of the liver persisted in all the cases, resembling closely the structure of bone-marrow. He sums up his findings by saying that in these cases the cause of the swelling of the liver and spleen was a peculiar large and small cell proliferation in both organs, such as Borissowa and others have described in Banti's disease. This proliferation was nothing but the result of the overextension of the hematopoietic function of both organs, and it was of the form that usually is confined to the fetal period, early discontinued in the spleen, and in the liver persists only a short time after birth.

A similar abnormal persistence of the blood-forming foci was also found microscopically in the kidneys, lymph nodes, and bone-marrow, as far as the examination was possible. It is important to exclude syphilis as a cause of this abnormal persistence, or reawakening, of the function of the hematopoietic system. As is known, syphilitic virus exerts this effect upon the liver of congenitally syphilitic fetuses; and in the kidneys of normal, and especially the syphilitic newborn infants, this round-cell accumulation, so frequently observed, is nothing more than the residue of the fetal blood formation in this organ. All signs of syphilis were absent in these cases, both clinically and anatomically. Furthermore, changes were never observed in the spleen in syphilis similar to those found in these cases. In these 4 cases of splenic anemia, however, the syphilitic virus could not be excluded absolutely as the cause which produced the abnormal extension of the fetal developmental period, affecting particularly the hematopoietic system.

Hunt² reports in detail the clinical course and hematology of a case of infantile pseudoleukemia with the postmortem findings. The customary blood picture as described above was present in his case: hemoglobin, 38 to 30 per cent. (Dare); erythrocytes, 3,120,000 to 2,720,000; leukocytes, 14,400 to 19,540, and erythroblasts, 2660 to 17,600, of which the normoblasts were 6 to 43 per cent., megaloblasts 94 to 57 per cent. the predominating leukocytes were the mononuclear variety, and mye

¹ Virchow's Archiv, clxxxii, Nr. 3.

² Journal of the American Medical Association, February 3, 1906.

locytes varied between 8 and 10 per cent. At autopsy he found in the spleen a moderate amount of degenerated blood-coloring matter. In the splenic pulp itself he noted: (1) The presence of a large number of round cells with oval nuclei, and a varying amount of protoplasm; (2) a great increase in eosinophilic cells, containing usually one or two dark-staining nuclei; (3) a deposit of degenerated amorphous blood pigment in the intercellular spaces; (4) a great diminution in the usual number of erythrocytes. The Malpighian corpuscles did not appear to be affected to any appreciable degree. The liver showed no deposit of iron pigment in the liver cells and there were no collections of round cells between them. He believes the syndrome to be a distinct disease and that it can be distinguished from pernicious anemia, leukemia, and secondary anemia with leukocytosis.

Still¹ reports 2 cases which possibly belong under this heading, 1 of which he describes in detail.

Wolff² believes it to be a distinct disease, basing his belief upon the blood picture, and claims that it is a primary splenic disease. He describes his case in detail, giving the result of the blood examination, together with the examination of the spleen. In this organ he found an increased induration of the walls of the pulp lacunæ; the same showed an infiltration with very different hemoglobin-free blood cells, in which large cells with divided nuclei resembling myelocytes predominated. A marked increase in lymphocytes was not found, nor was there any unusual enlargement of the Malpighian bodies. On the other hand, in all the large bloodvessels, especially the arteries, a large number of lymphocytes were found in the contained blood. Drysdale and Thursfield³ also believe this to be a distinct "primary" anemia of infancy, distinguishable from all other anemias of infancy both by its clinical course and by the characteristic changes in the blood. They give the symptoms in detail and also extensive blood charts. Moorehead⁴ holds to this same view. He reports a case which at autopsy showed tuberculous mesenteric lymph glands. He believes the presence of the latter to be merely a coincidence and to have no influence upon the causation or progress of the disease. The rickets present was also of a very mild character. He gives the pathological findings in spleen, liver, and bone-marrow.

In contradistinction to the more commonly expressed view, Grawitz⁵ and Japha⁶ think it can hardly be classified as a distinct disease, and look upon it more as a group of phenomena symptomatic of different primary

¹ Medical Record, February 3, 1906.

² Berliner klinische Wochenschrift, xliii, Nr. 49.

³ Medico-Chirurgical Transactions, vol. lxxxvii, p. 451.

⁴ Dublin Journal Medical Sciences, May, 1906.

⁵ Klinische Pathologie des Blutes, 1906.

⁶ Handbuch Kinderhielkunde, Pfäundler und Schlossmann, 1906, Band I.

diseases, these diseases causing an anemia. The marked hyperleukocytosis in conjunction with the presence of nucleated red corpuscles in the circulating blood point to the fact that the bone-marrow is actively stimulated. They also hold that an active hypernormal pouring out of leukocytes may be physiological in childhood.

Heubner¹ groups all these cases of splenic forms of anemia under one heading and apparently does not consider any of them distinctive enough to be classified as diseases *sui generis*. Potpeschnigg² describes a case which is interesting in this connection. A boy, two and one half years old, with no lues or tuberculosis, and very slight rickets, with a history of being ill three weeks, came under his care. The lips and eyelids were markedly edematous; there were subcutaneous hemorrhages; the liver and spleen were enlarged, but there was no glandular enlargement. The blood picture was as follows: hemoglobin, 10 per cent.; erythrocytes, 990,000; leukocytes, 4000; numerous nucleated reds; lymphocytes, 69 per cent.; neutrophils, 29 per cent.; eosinophiles, 0.8 per cent.; large mononuclears 0.8 per cent., neutrophile mononuclear cells 0.3 per cent. The child left the hospital in good condition, but returned a short time later with the spleen and liver very much enlarged, petechia, epistaxis, bloody stools, cervical and inguinal glandular enlargement, and pain in the long bones. The blood at this time showed erythrocytes 212,500, leukocytes 64,500, hemoglobin 15 per cent. The blood picture was typically leukemic: lymphocytes 93 per cent., polymorphonuclear neutrophils 6 per cent., and eosinophiles 1 per cent. The diagnosis on the first admission was "probable anemia pseudoleukemica infantum," notwithstanding the absence of leukocytosis and of splenic and glandular hypertrophy. The author also considered the possibility of pernicious anemia, although no poikilocytosis was present. The autopsy showed lymphatic leukemia.

TREATMENT. Heubner³ advises a mixed diet of vegetables and meat, or meat juice; occasionally also fresh bone-marrow may be used. He places iron above arsenic as a drug in these cases, advising the double salt of the former (*ferri pyrophosphatum cum ammonii citricum*) in doses of 1.5 to 2 grams (23 to 30 gr.) in 80 grams (2½ oz.) of water, to which is added 10 grams (2½ dr.) of syrup containing bitters. This he gives three times a day at meal-time. He also recommends fresh air as a valuable adjunct to the treatment. Hunt⁴ and Sill⁵ advise the use of arsenic, in addition to general hygienic and dietetic measures, as a most important drug, as do most of the writers on this subject. Sill also uses cod-liver oil in addition. Moorehead⁶ tried x-rays in a case with no

¹ Lehrbuch der Kinderheilkunde, 1906, Band ii.

² Wiener medizinische Wochenschrift, 1907, Nr. 1.

³ Lehrbuch der Kinderheilkunde, 1906, Band ii.

⁴ Journal American Medical Association, February 3, 1906.

⁵ Medical Record, February 3, 1906.

⁶ Dublin Journal of Medical Sciences, May, 1906.

result. Wolff,¹ considering the disease as being primary in the spleen, excised that organ in one case with a very favorable result. He states that in spite of the favorable prognosis generally accepted in this condition, the figures which have been published to date do not warrant this position. Drysdale and Thursfield² report the fatal termination of 8 cases out of the 20 collected; and also state that many of the remaining 12, in spite of careful hospital treatment over several months, show no sign of improvement.

Stains and Methods for Examining Blood. Assmann³ describes a new method for staining blood, pus, sputum, etc., with a methylene blue-eosin mixture, which may also be used for staining sections of tissue. The dried specimen spread on a slide without any previous fixation is placed in a Petri dish. Forty drops of the ordinary methyl alcohol solution of eosin-methylene blue are then poured over it. After three minutes in the stain, 20 c.c. of distilled water, to which have been added five drops of a 1 to 1000 solution of potassium carbonate, are poured over the slide and mixed until the fluid assumes a clear, homogeneous, bright-violet color. After five minutes the specimen is removed and dried without further washing. For staining sections, five drops of a 1 to 1000 acetic acid solution are added to the 20 c.c. of water, instead of the potassium carbonate solution. The section is stained fifteen minutes (instead of five minutes), dehydrated with absolute alcohol, cleared in xylol, and mounted in neutral Canada balsam.

May⁴ suggests a new method for applying the Romanowsky stain. He stains the specimen in 0.25 per cent. methyl-alcohol solution of eosin-methylene blue, it is then placed for one minute in distilled water; without allowing it to dry he adds one drop of 0.5 per cent. methylene-azure solution and spreads it over the film by rocking. When the characteristic red color appears, it is washed and dried. Viereck⁵ recommends the above (May) method of staining.

Murphy and Strodl⁶ compare the results obtained by means of the Einhorn-Laporte⁷ method and those of the customary Thoma-Zeiss method for enumerating corpuscles. The former method consists of counting the red corpuscles and white corpuscles in a stained film instead of diluting the blood and counting the corpuscles in a cell of fixed dimensions as is used in the latter method. The counting of the dried film is made with an eyepiece and objective of known magnifying power. The cells in the field are then counted and enough different fields are computed to correspond to one square millimeter, which is determined

¹ Berliner klinische Wochenschrift, xliii, Nr. 49.

² Medico-Chirurgical Transactions, vol. lxxxvii, p. 451.

³ Münchener medizinische Wochenschrift, liii, Nr. 28.

⁴ Ibid., Nr. 8.

⁵ Ibid., Nr. 29.

⁶ New York Medical Journal, October 27, 1906.

⁷ Medical News, April 19, 1902.

by estimating the area covered in one field. As the reds are more numerous a glass diaphragm is used in the eyepiece, which is subdivided into small squares to assist in the counting. The authors find that with this apparently very crude and inaccurate method the error is no greater than is liable to occur in the Thoma-Zeiss method. They also claim for it certain advantages. For example, one may make the blood spreads at the bedside of the patient, and stain and examine them in the office; and a differential enumeration can be made in the same spread that is used for the counting. They made ten counts which varied from the Thoma-Zeiss counts as follows: red from 12,000 to 561,000, average 232,000 reds; whites from 200 to 10,200, average 2196. The Einhorn-Laporte method gave six readings lower and four readings higher than the Thoma-Zeiss method. For a very rough estimate of great variations in number of blood cells, Murphy and Strodl recommend the use of the former; but the figures they show certainly do not approach, in accuracy, those obtained by the Thoma-Zeiss instrument.

Simon¹ has devised a counting chamber which he believes is much simpler than the one used in the ordinary Thoma-Zeiss apparatus. It differs only in the ruling of the slide, that being divided into 100 large squares each having a capacity of 0.004 c.mm.; the large squares are divided by a double-ruled line. Where these lines intersect, they form small squares having a capacity corresponding to 0.00025 c.mm. He uses the large squares for counting the leukocytes and the small squares for counting the erythrocytes.

Emerson,² in studying the blood of young adults, compares the results of various instruments for the determination of hemoglobin, and also estimates the degree of error in those instruments and the degree of error in the Thoma-Zeiss instrument for counting the red and white corpuscles. The error in counting the erythrocytes ran as high as 200,000; in comparing the count in the same individual on different days, 80 per cent. of the tests were below 100,000, however, and the average variation was only 64,200. In estimating the hemoglobin, he found the greatest variation in the Fleischl instrument, and least in the Tallquist, although, as the latter has a visible scale, it cannot be accepted entirely. He considered the Miescher modification of the Fleischl instrument to be the most accurate, but believed it required more care and training in its use than the other instruments. He found great variation in the enumeration of leukocytes. This, however, could not be controlled.

¹ Journal of the American Medical Association, November 24, 1906

² Bulletin of Johns Hopkins Hospital, January, 1907.

PURPURA HEMORRHAGICA.

The nature of purpura hemorrhagica remains as much a closed book as ever, and it can be said that no true progress has been made in the knowledge of the etiology of this interesting condition. Clinically, however, some light has been thrown upon forms not well recognized hitherto; and, if we are to believe the French school, its occurrence alone and as a complicating factor, or sequel, of certain infectious processes, is more frequent than has been generally supposed. The most valuable of recent contributions to the subject are those of the French, and the bulk of other literature appertaining to it consists of case reports and generalizations based upon relatively scanty evidence.

The studies of Bensaude and Rivet¹ command attention. They consider at length the chronic forms of purpura hemorrhagica, and state that if the text-books are searched for a description of this condition little or nothing will be found except that of the ordinary variety with a rapid course, described under the name of Werlhof's disease; and they find that current medical literature must be consulted for information concerning it. Most authors consider the condition rare, because such patients are usually lost sight of as soon as their hemorrhagic crisis is past; but they must not be considered cured. For ten years one of the above-named authors has collected cases of purpura hemorrhagica, and some of them have been followed several years with the finding that practically all such remain invalids after the termination of their acute attacks; that is to say, the condition is one of a chronic disease, showing itself by hemorrhagic exacerbations with longer or shorter intermediary periods of apparent health. These cases are far from being rare; and Bensaude and Rivet report 15 that came under their own observation, together with others collected from literature. They find that patients suffering from chronic purpura hemorrhagica present themselves to the clinician for various complaints, which can be classified, however, under two heads: (a) a continuous form of the disease; (b) an intermittent form of the disease. The former of these two varieties seems to be the more rare. Sufferers from this complain of general weakness or of gastric and intestinal troubles. On routine examination ecchymoses and purpuric spots are discovered; and in answer to questions the patients state that for some years they have had such spots almost continually, but have attached no importance to them because they disappeared rapidly. It is also found that they are subject to nose-bleed and that their gums bleed with the most deplorable facility. If such cases could be followed, it would be seen clearly that they present almost continually, either in the skin or in the mucous membranes,

¹ Archives générales de médecine, 1905, i, 195

some manifestations of the hemorrhagic diathesis which affects them chronically and continually, though very rarely, or never, occasioning the grave accidents which characterize the crises of purpura hemorrhagica.

The second form of purpura hemorrhagica seems to be the more frequent. In those cases the hemorrhagic diathesis reveals itself at longer or shorter intervals by crises of typical purpura hemorrhagica, of which the symptoms are poorly defined and inconstant. The crises of purpura hemorrhagica are sometimes preceded for months, or even years, by frequent isolated hemorrhages, epistaxis, or stomatorrhagia. Considered alone these crises are not to be distinguished from the classic description of Werlhof's disease. Contrary to the current opinion, however, they can be accompanied by a febrile movement. After a variable duration prolonged often by these exacerbations, so well recognized in the course of all purpuras, health apparently returns, and a latent phase of the affection succeeds. One could think the patient cured; and, in fact, some of these cases are free from all morbid phenomena until the appearance of a new crisis.

More frequently, though, on questioning them carefully, there is found some abnormal symptom, such as epistaxis, ecchymoses, following the slightest traumatism, or menorrhagia simulating a uterine infection. At other times, it is the general health which is affected, the patients experiencing a sensation of pain in the limbs, and of continual fatigue, and having the waxy color of anemia. Often they complain of digestive troubles; the digestion is slow and painful and is accompanied by a feeling of heaviness after a meal. Nevertheless these people get along fairly well until, under influences not well recognized, a new crisis of purpura hemorrhagica appears, to put an end to their comfort, thus showing the existence of a chronic and intermittent affection. I recall several cases of this remitting or intermitting type of purpura.

Besides these principal aspects, there are numerous clinical variations; thus, in 3 of the cases observed by Bensaude and Rivet there was an alternation of visceral and mucous membrane crises with the purpuric eruption. This latter disappeared when grave hemorrhages appeared, only to reappear very soon again. It is a curious fact that an intercurrent infectious disease may not awaken the hemorrhagic phenomena. The duration of purpura hemorrhagica is extremely variable, often very long; and Hayem¹ says the condition depends upon a true hemorrhagic diathesis, so that some of these patients have had recurrent attacks for more than twenty years. It must, however, be observed that recurrence does not of necessity indicate the existence of a "diathesis." As to the intermediary periods, they may also be very long; thus the hemorrhagic diathesis has been known to become active after seven or eight or (in 1 case) even seventeen years. The mode of termination is not less

¹ Société médecine des hôpitaux de Paris, July 27, 1891.

variable; and, even though the observer be given the duration of the latent periods, it is impossible to say when such a condition is cured. For this reason the prognosis should be guarded; and because these patients may die during a crisis, as occurred in 5 of the cases reported by Bensaude and Rivet, these authors consider it a mistake to regard this affection as benign.

The diagnosis of these conditions is sometimes very difficult. Not only may local injury or disease be simulated by bleeding from a part or organ, thus misleading one as to the existence of a blood dyscrasia; but also when these hemorrhages are multiple there is often extreme confusion, and the condition is regarded as hemophilia. There are, however, well-marked differences between the two diseases, as Hayem has shown. *Hemophilia* is a congenital and hereditary affection; but above all others in importance as a differential point is the examination of the blood. The blood of the hemophiliac is characterized by a considerable diminution of coagulability, with the peculiarity, according to Hayem¹ that the coagulation is hastened by the action of heat, and that, the clot once formed, its retraction occurs normally. In *chronic purpura hemorrhagica*, on the contrary, the coagulation occurs after a normal interval, but remains absolutely non-retractile. As a corollary the examination of the blood reveals a considerable diminution of the hematoblasts. These two characteristics (according to Hayem) can exist in some chronic cases in the absence of the purpuric eruption, allowing us to diagnosticate a purpura hemorrhagica without purpuric spots. Bensaude and Rivet have been unable to confirm the "myeloid reaction" emphasized by Lenoble² in authentic purpurics, and in examining numerous preparations of blood no nucleated red cells were seen. According to Lenoble these elements, however, are extremely rare in the chronic forms except in certain exacerbations. Litten, on the other hand, remarks that the nucleated elements occasionally may appear in hemorrhagic purpura, but that they are not at all constant. This is also the opinion of Hayem,³ according to whom the appearance of nucleated cells in purpurics is simply a sequel of the anemia and is in proportion to it. My view coincides with that of Hayem. I have repeatedly found considerable erythroblastic crises in cases of purpura hemorrhagica.

Bensaude and Rivet state that for a long time it has been noticed that hemorrhages occur in latent hepatic conditions of various kinds. They consider the fact of significance in conjunction with some cases; but though they have searched carefully in their patients for signs of hepatic insufficiency, none has been found.

A toxic infectious etiology has been ascribed to hemorrhagic purpura, and years ago Hayem suggested a chronic gastro-intestinal form which,

¹ Du sang, 1889, p. 999.

² Archives de médecine expérimentale, 1903, Nos. 2 and 3.

³ Leçons sur la maladies du sang., p. 570.

as Bensaude and Rivet remark, is not unlikely, if we consider the role it plays in a similar condition, viz., scurvy.

It is well known that Henoch described, in connection with his purpura fulminans, a subacute form in cases where digestive troubles were in close relation with the hemorrhages. In conformity with the above, Bensaude and Rivet were able to find dyspepsia and various digestive troubles in a majority of their cases.

Numerous bacteriological investigations have been made on the basis of a possible infectious nature, but without avail as to the specificity of any one kind of organism; and they think it more probable that all organisms under certain conditions can become causative. All attempts at aërobic or anaërobic cultures were without result; but the writers do consider one infection of distinct significance in connection with the disease, and that is tuberculosis, which will be presently referred to.

These cases considered by Bensaude and Rivet also bear a resemblance to that class of cases grouped by Osler under the type of erythema exudativum; and as pointed out editorially,¹ in an article based chiefly on the above-mentioned work of Bensaude and Rivet, the condition is one which has so far remained unnoticed in this country. Further investigation of these interesting subjects would be desirable.

Bensaude and Rivet² discuss the association of purpura hemorrhagica with *tuberculosis*. They say that clinical experience has shown that tuberculosis at times is prone to be followed by or complicated with purpura. This idea is of relatively recent date, though for ten years the authors have been collecting cases. The review of these, together with the littérature on the subject, allows them to emphasize the occurrence of purpura in tuberculosis of any locality, whether pulmonary or not, that is, in tuberculous peritonitis, pleuritis, meningitis, and glandular involvement. They consider that the purpuric manifestations indicate an acute exacerbation in the progress of a slowly progressive tuberculosis; and that the subsidence of the purpura always finds the phthisical process more advanced.

Their conclusions are that in the presence of a purpura, of which the cause is not clear, especially if it be recurrent or chronic purpura, every effort should be made to discover some tuberculous focus which could have given rise to it. In the course of tuberculosis, at any stage, the appearance of purpura greatly modifies the prognosis. At an advanced period it indicated a profound cachexia; and, often in these circumstances, the purpuric state is but a terminal episode. Always it reveals an acute process which is found advanced on the disappearance of the purpura, and often the latter is the precursor of a generalized tuberculosis. Gerber³ reports 2 cases of acute purpura in which an infectious origin

¹ Journal of the American Medical Association, xlv, No. 23.

² Presse médicale, July 25, 1906.

³ Wien. klin. Rundsch., xix, Nr. 17.

was probable, as both cases occurred within a short time in the same house.

Hastings¹ reports a case of purpura hemorrhagica which he thinks of interest, because of the close resemblance in the clinical course of some cases of Werlhof's disease to the cases of acute leukemia which are not infrequently reported in the literature of today. This resemblance has not been commented upon by most writers on acute leukemia, or by authors of books upon blood diseases. Berançon and Labbé² class purpura hemorrhagica among the pseudoleukemic states. Hastings' patient had no family history of significance, and was apparently healthy until sixteen years of age, when he presented himself after two weeks' indisposition complaining of weakness and inability to work. These symptoms followed closely upon severe epistaxis which occurred without warning and without apparent cause. The bleeding continued "by spells," the urine remained clear and negative, the gums were not sore, but the stools became black and sticky, containing much blood and blood pigment. There was loss of appetite and loss of weight, and some swelling of the right tonsil. The gums became slightly swollen and from them oozed this watery blood. A few blebs, one-half millimeter in size, appeared on the right eyelid, the temperature was 101° F., the pulse 120. There was a soft systolic murmur at the apex. Scattered over the entire body were purpuric spots of varying age, some being tender on pressure, but not raised or indurated. The blood showed a "coagulation time" of from seven to nine minutes (Wright), hemoglobin 33 per cent., erythrocytes 1,016,000, leukocytes 3000. Red cells were normal excepting for moderate polychromatophilia. The differential count of leukocytes was: polymorphonuclears 50.3 per cent., lymphocytes 38.3 per cent., large mononuclears 11.3 per cent. In the course of ten days the spots grew less, the boy became weaker and paler, and the blood picture changed to the following: erythrocytes pale, blood plates absent, hemoglobin 20 per cent., erythrocytes 1,300,000, index 0.76, leukocytes 4000. The differential count was: polymorphonuclears 22 per cent., lymphocytes 66.5 per cent., large mononuclears 11.5 per cent. The purpuric spots reappeared with edema of the feet and ankles. The temperature became high, and despite treatment with iron, arsenic, adrenalin, and diet, the patient died in a little less than six weeks after the onset of the disease. Hastings thinks that the acute condition, the swelling of the right tonsil, and the high percentage of lymphocytes in the peripheral circulation suggested the possibility of acute leukemia, with an intercurrent infection from the right tonsil giving rise to a well-marked leukopenia. Other sources of infection were carefully sought, but were not found. The decrease of

¹ American Journal of the Medical Sciences, cxxix, 787.

² Traité d'hématologie, 1904, p. 683.

the number of leukocytes in leukemia from 100,000 to 30,000 to 4000 (or even lower in some of Cabot's cases) has occurred, but so far as Hastings could discover, only in cases with a severe intercurrent infection, such as pneumonia, empyema, or septicemia. He thinks the history and symptoms, and the character of the lymphocytes found, exclude leukemia in favor of Werlhof's disease. The lymphocytes showed none of the large lymphocytic forms with "azure granules" (erythrophilic but not acidophilic), the so-called Türck's lymphoid marrow cells, but on the contrary they were of the lymphocytic and large mononuclear type found in the normal blood.

In a discussion of the general subject of purpura hemorrhagica, Levison¹ reports an average case which improved because of, or independently of, ordinary measures. He calls attention to the increased interest the question has aroused lately in connection with the bacterial investigations of many workers. Letzerich was able to isolate an organism from the blood of a female patient, which produced purpura in rabbits. Other investigators have found bacilli or streptococci. The findings of various writers on this subject have been too divergent to allow the consideration of the etiological factor of purpura hemorrhagica as being settled. In connection with the bacterial origin of this disease the low percentage of eosinophiles in Levison's case is of interest. Simon has pointed out the relative decrease of eosinophiles in the infections, and this finding in this case is for that reason worthy of record as a possible link in the chain of evidence which tries to prove purpura an infectious disease. Simon believes that a hypo-eosinophilia associated with an increase of the polynuclear neutrophilic elements is one of the "most subtle means of diagnosing certain bacterial infections," and cites a list of infections, including appendicitis, pneumonia, empyema, variously situated abscesses, peritonitis, etc., in which this finding is present.

Loveland² mentions an instance of chronic purpura hemorrhagica in a breast-fed child beginning at or shortly after birth, and continuing until the patient was lost sight of at the age of eighteen. The symptoms were essentially petechial hemorrhages appearing in crops without other phenomena, though the child was scarcely ever free from spots. After the fifth year the spots appeared at gradually lengthening intervals, and the rheumatic phase of the case became more pronounced, affecting the joints, especially those of the knees and shoulders, with inflammatory reaction. Monsel's solution and a tight bandage generally controlled external hemorrhage. The child's blood became thin, lacking in color, and was not easily coagulated; he bled excessively from the slightest wound. Treatment had no effect, and the case was differentiated from scurvy by the absence of emaciation, spongy or bleeding gums, and

¹ Journal American Medical Association, vol. xlvii, No. 12.

² Ibid., xlv, No. 2.

swelling or deformity of thigh, leg, or other bones; and also by the absence of any causative factor in the diet.

Van Sweringen¹ reports a case of purpura in a young woman of twenty-five which appeared in the fifth month of her first pregnancy. Hemorrhages occurred from the gums and nose, into the cellular tissues and skin, and appeared in the urine and vaginal discharge. From none of these localities was the bleeding very profuse or serious at any one time. Continuing, however, over a period of two or three weeks, considerable anemia was produced and the prognosis was rendered unfavorable. The hemorrhagic tendency subsided, however; the pregnancy went to term, the delivery was accomplished by forceps and was followed by no internal hemorrhage, the puerperium being perfectly satisfactory. The treatment adopted consisted of rest in bed, 5-grain doses of calcium chloride with 1 grain of extract of suprarenal gland every three hours, and gelatin "ad libitum." Several cervical cauterizations done in the early months of pregnancy to relieve the nausea and vomiting were looked upon by Van Sweringen as possible causes of the condition, because of the purulent discharge which followed. Absorption of infectious material from the cauterized areas seems probable, although no leukocytosis was present.

Schofield² speaks of a case of infectious purpura in a married woman of thirty-four which came on suddenly, ran a protracted course, with the formation of raised purpuric areas (which eventually sloughed), and was in his opinion favorably influenced by quinine, the patient finally taking with benefit as much as 24 grains of the sulphate daily.

Manasses³ records 3 cases of rheumatic purpura in children. The first was that of a child (three years old) of rheumatic diathesis. The attack was ushered in with headache, sore throat, nausea (but no vomiting), and a temperature ranging between 102° and 104° F. On the third day the eruption appeared on the lower limbs and spread rapidly over the entire body, with the formation of blebs, some of which became necrotic. On the sixth day the child could not distinguish objects placed before the eyes. There was a trace of albumin in the urine, but no blood from the mucous membranes or bowels. Recovery was slow, and fully two weeks elapsed before the purpura disappeared. The other 2 cases, in children aged eight and nine years respectively, were mild and followed a course similar to the first, but the symptoms were less severe.

Tanner⁴ reports a case of subacute purpura hemorrhagica in a boy of nine and one-half years, which ran a course of a few weeks and then disappeared, leaving him apparently none the worse.

¹ American Medicine, November 25, 1905.

² Lancet, September 23, 1905.

³ American Medicine, July 1, 1905.

⁴ Western Medical Review, February, 1906.

Joseph¹ reports an interesting case of *Henoch's purpura* in a girl of three years with sharp gastric crises simulating appendicitis, for which operation was seriously considered. She also presented various gastrointestinal disturbances, such as extreme flatulence and borborygmus and vomiting, with a rapid pulse and slight temperature. She suffered several attacks, which grew less severe. Joseph has found in recent literature reports of such cases in which laparotomy has been performed.

I have always believed that purpura (whether of extreme hemorrhagic type or not) is a condition that may have extremely varied causes. It may, for example, be purely mechanical, as in cases of high blood pressure, asphyxia, or vascular disease; toxic, in mineral or venom poisoning; infectious, as in definite or obscure, and cryptogenetic infections, and nervous, as in hysteria, etc. Each case must be investigated from the standpoint of such a possible variation of etiology.

HEMOPHILIA.

As is the case with many other questions, we find, on reviewing and summing up our knowledge of hemophilia, that though a few suggestions of value have been made as to the treatment, a single year contributes little to our real knowledge of the disease. The differential points between it and purpura, sometimes most difficult of determination, have been well brought out, however, by Bensaude and Rivet (see *Purpura Hemorrhagica*) and should tend toward less confusion in that direction.

Larrabee² goes over the question of *hemophilia in the newborn*; and after considering the literature of the subject concludes that "in the light of modern theories of inheritance, it is difficult to account for the transmission of any character in the way common to hemophilia. In spite of the *a priori* improbability of such occurrences, too many cases have been observed to admit of a doubt. Still the rule has many exceptions. According to Grandidier, about one bleeder in thirteen is a female. Several recent writers consider the preponderance of males much less marked. Fahndi states that nearly a third of the number are females. It would appear that in some families the occurrence as to sexes and the inheritance (through the females alone) is strictly according to rule, as in the cases of Sahli and Lossen. In others the occurrence as to sexes is irregular. Steiner's cases were particularly bizarre; as only females suffered, and the disease was transmitted directly from mother to daughter, males neither inheriting the disease nor transmitting it. In some families the rule of transmission only through the females is frequently broken, as in the case mentioned by Litten in which the

¹ Medical Sentinel, Portland, Oregon, 1905, No. 13.

² American Journal of Medical Sciences, March, 1906.

father transmitted the disease directly to the sons through three generations. Larrabee thinks that it should be emphasized that hemophilia is but a rare cause of uncontrollable hemorrhage in the newly born. The importance of this is obvious. Given an infant suffering from this condition the chances are all in favor of the hemorrhage being due to a cause which is temporary. No effort should be spared to save the child's life, since if it survives a few days there is every probability of continued health.

Ryerson¹ has presented, at length, a review of the joint manifestations in hemophilia, and has epitomized our present knowledge and treatment of the subject. After a review of the historical aspect, he calls attention to the similarity between tuberculous conditions of the joints and the hemophilic manifestations occasionally seen in them. He recalls the fact that in one year an authority on tuberculosis of joints operated on two hemophilic knees, under the impression that they were tuberculous. Other instances of this error have occurred; and in all the cases death resulted from slow oozing some days after the operation, in spite of every form of treatment then recognized as advisable. He points out that though any joint may be affected, the vast majority of the hemorrhages occur in the knee. The diagnosis in the early or acute stage is difficult, especially in those cases following moderately severe trauma without a rise of temperature and marked pain, since aspiration is the only means of determining the nature of the effusion.

Pathology. Ryerson agrees with the usually accepted view that joint manifestations in hemophilia are due to intracapsular hemorrhage, rheumatism and gout playing no part whatever, although they may coexist. The hemorrhage may occur without any appreciable trauma, though more often a slight fall or blow is the exciting cause. He modifies König's classification as follows:

First Stage. The first stage is simply the presence of free fluid blood in the joint. It is rapidly absorbed under proper treatment, and leaves no traces except a moderate brownish or yellowish discoloration of the capsule and synovial surfaces, due to the retention of blood pigment. The articular cartilage on the ends of the bones does not lose its gloss or whiteness, and joint function becomes normal. Many patients after an attack of this kind have no recurrence in any individual joint, though several articulations may suffer in succession. These cases, therefore, present little of interest to the orthopedic surgeon and are usually treated successfully by the general practitioner as acute articular rheumatism.

Second Stage. With repeated hemorrhages in a single joint distinct pathological changes take place which are very remarkable. The capsule becomes thickened and succulent and much darkened. A fibrinous deposit appears all over the capsule and the synovial folds.

¹ Journal of the American Medical Association, June 23, 1906.

Delicate, brownish, pigmented tufts form on these areas, and later filiform, slender threads grow from them and float swayingly about in the blood serum like seaweed. The articular cartilage itself is invaded by brownish patches and tufts and begins to degenerate, and curious characteristic defects are left, shallow, and irregular, like the outlines on a map. The rest of the cartilage becomes brownish and loses its gloss.

Third Stage. Later comes the third stage, with adhesion of these little tufts to the opposite articular cartilage, causing more or less complete ankylosis. The fluid in the joint is absorbed, and only the thickening of the synovial surfaces and the ankylosis remains, with usually a marked flexion of the joint. There is never any tendency to abscess or to sinus formation.

Clinical Manifestations. The clinical picture in the first stage, Ryerson says, may be confusing. Some cases resemble rheumatism with pain, swelling, and joint effusion. This type usually follows trauma, and when less severe may be diagnosed as simple synovitis; while other cases come on spontaneously, with a painless and fluctuating swelling of the joint and little or no interference with function. Either variety progresses rapidly to perfect cure unless followed by exacerbations due to repeated hemorrhages. In the second stage we see what is often a perfect picture of a tuberculous joint in a subacute condition: thickened capsule, effusion, limitation of motion, beginning flexion deformity, and spasm of hamstring muscles. This was the condition of the joints operated on by König. Atrophy of the limb is pronounced and the differential diagnosis is most difficult. In the third stage there may be a complete bony ankylosis, as in a case reported by Summers, with atrophy and marked flexion, or perhaps a great limitation of motion, with the patella fastened to the femur by small areas of bony adhesions arising in places where the cartilage has been destroyed. It is stated that a rise of temperature may occur during acute attacks of hemarthrosis, to as high as 102° F., but it is rare, and rapidly subsides, becoming normal in a few days.

Diagnosis. Ryerson outlines the diagnosis in the different stages:

First Stage. The conditions most closely resembling the first stage of hemarthrosis are acute synovitis and intermittent hydrops. In acute synovitis there is always a history of a fairly severe injury, the pain and discomfort are generally greater, and a local point of distinct tenderness can be made out at the site of the injury. The pain on motion and the functional disability are greater than in hemarthrosis and the effusion disappears more slowly. A careful aspiration of the fluid, under rigid asepsis, using a needle of a very small caliber, would probably be harmless in any case and would afford valuable information. It is practically painless if skilfully done, and Ryerson recommends it as a routine procedure in doubtful cases.

Intermittent hydrops, or hydrarthrosis, is a very rare disease, only

about 70 cases being reported in the literature. It is characterized by a sudden painless, or nearly painless, effusion into the joint, a rapid disappearance of this effusion, and a complete recovery, followed by a series of precisely similar attacks at remarkably regular intervals, this periodicity, the mildness of the attack, and the absence of any traumatism being the chief characteristics. In a few cases the pain has been a more prominent feature. Nothing is known of the etiology, and aspirations have shown usually a clear, sterile fluid.

The various forms of infectious arthritis, such as gonorrheal, typhoid, pneumococcus, scarlatinal, and so forth, as well as the ordinary pus-germ infections, are much more painful and persistent than hemarthrosis, are attended with greater constitutional disturbance, and have the antecedent disease as a suggestive factor in the diagnosis. Acute articular rheumatism is rarely confined to a single joint, and has the same general diagnostic differences as the other infectious arthritides.

A true hemarthrosis is unquestionably the cause of the joint symptoms occurring in the so-called hemorrhagic diseases, such as Henoch's purpura rheumatica (Schoenlein's disease), purpura hemorrhagica, and scurvy. In these diseases the petechial hemorrhages into the skin and mucous membranes will at once suggest the probability of a similar involvement of the synovial tissues.

Second Stage. In the second stage the thickened capsule, the limited motion, and the beginning flexion suggest tuberculosis, but careful examination will show that the spastic contraction of the hamstrings is not a true reflex spasticity, but can be voluntarily relaxed. Also there is no free fluid in hemophilic joints after the hemorrhage has been absorbed, and no individual points of tenderness can be found. Nearly all, if not all, tuberculous joints show a permanent increase in both local and bodily temperature, the latter usually reaching 99° F. or 99.5° F. in the afternoon. The general onward march of the lameness and swelling, without any very sudden exacerbations or remissions, together with perhaps a cold abscess or night crises, would point to tuberculosis. Some of the so-called chronic rheumatoid diseases, especially arthritis deformans, bear a certain resemblance to hemarthrosis, but the characteristic grating, the slow onset, the involvement of several joints, and the presence of irregular bony cartilaginous hypertrophies at the edges of the joints would exclude hemarthrosis.

Third Stage. In the third stage the clinical picture may be exactly that of an old tuberculous joint with complete ankylosis and without evidence of suppuration. It may be absolutely impossible to make a diagnosis without the aid of a complete and intelligible history of the case. The flexion of the hemophilic knee is usually not so exaggerated as that of an untreated tuberculous knee, and there is less backward displacement of the head of the tibia. Before considering operation in any old ankylosed joint where the history and examination do not

positively rule out hemophilia, a test of the coagulability of the blood should be made.

Treatment. The treatment of the primary stage should be such as will promote the absorption of the effused blood. Ryerson recommends aspiration with a fine needle, believing that it is of great importance to prevent, so far as possible, the deposit of fibrin on the joint surfaces, and that it is hardly possible for a fatal hemorrhage to occur through the wound of a small needle. Sheldon¹ agrees with Ryerson that the joint should be aspirated with a fine needle in this stage. After the blood has been removed, a few cubic centimeters of adrenalin solution should be injected and a pressure bandage applied for five or six hours. The absorption of the blood, in case aspiration be deemed inadvisable, can be hastened by free use of the affected joint. It should not be put up in a plaster cast or in any other kind of fixation after the first day, because any aseptic fluid in any joint will be absorbed more quickly under motion and massage than under fixation. This has been well demonstrated by Hosmer, Henrotin, and others in their treatment of acute synovitis. Constitutional treatment by such drugs as gelatin, adrenal extracts, and calcium chloride offers some security against future attacks, and should be tried faithfully. It does not show any great uniformity in results. In the later stages, when there is a tendency to flexion, it is wise to apply traction until the joint is straightened, and then to use a splint or cast until the tendency has disappeared. Ankylosis in flexion might be corrected by the Goldthwait genuclast, by forcible manual redressment, or even by osteoclasis, followed by immobilization until ankylosis in good position has occurred. Any cutting operation should be shunned like the plague. Sheldon² believes that little can be done in old cases.

Moses³ reports a number of cases of psoas hematoma occurring in the course of hemophilia, and draws attention to the possibility of these muscle-blood tumors being a source of doubt in the diagnosis. He considers it inadvisable, in all cases, to operate, and recommends expectant treatment with the view toward absorption.

Pelissard and Benhamon⁴ report the case of an infant with hemorrhages from the nose, ears, skin, and digestive tract, the second day after birth. The child seemed to be otherwise healthy, but grew weaker under the constant loss of blood, which persisted notwithstanding energetic treatment with antipyrine, peroxide of hydrogen, gelatinized serum, etc. For twenty-four hours the hemorrhages continued, when 10 c.c. of isotonic sea-water was injected as a last resort. The hemorrhages ceased almost at once; by the end of three hours there was no further bleeding; the child wanted to nurse, and there has been no recurrence of the hemo-

¹ Medical Record, New York, October 27, 1906.

² Loc. cit.

³ Bruns' Beiträge zur klinische Chirurgie

⁴ Presse médicale, xiv, No. 77.

philic tendency to date. The day afterward, and again a week later, the injection of sea-water was repeated as a precautionary measure. They call the sea-water "Quinton's plasma," as Quinton is responsible for its use in therapeutics. This case may be properly classified, according to the views of Larrabee,¹ as being due to temporary causes and not necessarily a true case of hemophilia.

Coe² advocates the use of calcium lactate in hemophilia, and reports several cases greatly benefited by its use. It is administered in doses of 15 to 20 grains, and he states, in his case reports, that the effect is sometimes manifested at once, if there be a severe hemorrhage at the time. All his cases had been unsuccessfully treated with adrenalin, calcium chloride, styptics, and other remedies, but the effect of calcium lactate was seen not only in the diminishing or stopping of the hemorrhage, but also in the preventing, frequently, of the appearance of purpuric manifestations and in the causing of their early disappearance when present. Coe believes that the calcium and probably magnesium salts offer the best hope of relief of any therapeutic measures thus far advised, even though theoretically there is danger of causing thrombi formation. He believes this danger is overestimated because of the large doses given beneficially in a case of acute hemorrhagic purpura. He recommends the lactate because it is more easily absorbed by the patient than the chloride; and the taste is much more agreeable. Coe carried on coagulation experiments in these 5 cases, and found that in 2 of the 5 it was decidedly above the normal; in 2 others, a high normal; and in the fifth, a low normal.

SCURVY AND INFANTILE SCURVY.

Little has been added to our knowledge of scurvy and infantile scurvy during the course of the past year. Perhaps the most notable papers are those of Okada and Saito on the etiology; the discussion of bone changes by Looser; and Morse's analysis of 50 cases which came under his own observation. One striking fact stands out in a review of the year's literature and that is the frequency with which errors of diagnosis are made. In 80 per cent. of the cases reported the malady had been mistaken for some other condition.

Etiology of Scurvy. Okada and Saito³ studied the etiology of scurvy at Port Arthur immediately after its fall; for during the siege about 15,000 cases of this disease had occurred. They succeeded in isolating from the circulating blood of the patients during life, and from the internal organs after death, a coccus which could be readily grown on culture media, especially agar. Injections of these cultures into animals

¹ Loc. cit. ² Journal of the American Medical Association, October 6, 1906.

³ Sei-J.-Kwai, Tokio, xlv, p. 1993.

produced hemorrhagic lesions and the coccus could be recovered from the blood and viscera of these. Their conclusions were that the blood of scurvy patients contained a certain coccus; that this coccus showed a remarkable agglutinative reaction with the serum of scurvy cases; that when inoculated into animals it produced the phenomena of scurvy (bleeding, etc.), and that hence this coccus was to be regarded as the cause of scurvy.

Steeves,¹ however, says that "bacteriological causes for scurvy have not been satisfactorily proved, and while it seems not unreasonable to believe that further investigation will throw light on this side of the subject; and although the disease is declared uncommon by modern writers; yet it seems possible that in orphan asylums, and in institutions where children are overcrowded and underfed, many cases might be found if proper medical inspection were instituted." She refers to the case of a child of four years of age who was sent to her clinic from a large orphan asylum. She found a well-developed case of scurvy and prescribed treatment. When she visited the institution several days later, the child showed improvement, and she was informed by the matron that usually the cases did not get so bad as this one. She therefore concluded that these cases were not rare in such institutions. Upon examining the mouths of 180 girls at the Lancaster Industrial School, she found 20 per cent. had thickened, spongy gums, purulent and mucoid saliva, and the mucous membrane of the nose, mouth, and throat inflamed. These patients invariably complained of rheumatic pains. While the condition was not strictly scorbutic, it seemed to suggest a field for investigation.

Schubert² discusses the relations of scorbutus and *beriberi* appearing in epidemics. *Beriberi* has occurred in temperate climates in epidemic form when it has been impossible to trace the infectious character of the true disease. In tropical countries many cases which are called *beriberi* more closely resemble scorbutus. The term scorbutus, the author believes, is applied to several distinct diseases. He recognizes three varieties: land scurvy, which is an infection probably conveyed by food; sea scurvy, which is an intoxication caused by eating salt meat; and Barlow's disease, which occurs in infants, and is probably due to some maladjustment of the food. In the Russian epidemics the disease took on the character of an infection and infants were seldom affected; even infected mothers did not transmit it to the children they were nursing. On this account he believes that Barlow's disease should be considered as being distinct from scurvy.

Bostwick³ reports a case of scorbutus occurring in a bartender, who lived in extremely poor hygienic surroundings and subsisted, as a rule,

¹ Journal of the American Medical Association, June 30, 1906.

² Deutsches Archiv f. klinische Medizin, December 13, 1905.

³ Lancet-Clinic, 1906, lvi, 283.

on one meal a day and about twenty-five "whiskies." Under the usual treatment of fresh meat and vegetables, lemon juice, and antiseptic mouth washes, he improved and is now convalescent.

Bickhardt¹ gives the details of a case of sporadic scurvy occurring as a complication of tuberculosis of the cecum with tumor formation and consequent stenosis of the gut. He discussed the possibility of tuberculosis being a predisposing factor, and rejects this conclusion on the strength of his own large experience. The patient, on account of his condition, had taken nothing but a thin soup for months, and to this very limited fare Bickhardt lays the scurvy.

Auverny² has observed a case greatly resembling scorbutus, which was caused by the bacillus of Eberth. There was pronounced weakness; hemorrhagic patches covered the body; the joints were painful, and there was a temperature of 104° F. resembling the typhoid type. At the time of the development of the hemorrhagic patches there was a rise of temperature; this also accompanied a severe epistaxis ten days before death. After the epistaxes the temperature remained high. There were no apparent symptoms referable to the digestive tract, although autopsy revealed ulceration of Peyer's patches. In this case it would seem that the mischief was due more to the presence of the typhoid bacillus itself in the blood than to the toxins generated.

Pathology of Scurvy and Infantile Scurvy. In a fatal case of scorbutus reported by Senator,³ who made a special study of the blood, the erythrocytes showed a constant decrease until they reached about one-sixth their normal number; the hemoglobin showed a disproportionately rapid decrease, while the leukocytes increased constantly. The blood picture was that of a simple subacute or chronic posthemorrhagic anemia. Aside from the hemorrhages and anemia, autopsy revealed nothing excepting a hypoplasia of the left lung and uterus. No microorganism could be isolated from the blood or blood-forming organs.

Looser,⁴ in his paper on the bone changes in scorbutus and in Barlow's disease, concludes that Barlow's disease in its etiology, symptomatology, and pathological anatomy is identical with scorbutus. Scurvy brings about bone changes usually only in the young and growing skeleton. In the mature skeleton gross bone changes seldom take place except occasionally in the ribs; however, there occurs at times a scorbutic disease (solution) of the callus of healed fractures. As is known, callus for a long time after consolidation, has the character of young bone. The nature of Barlow's disease consists of only a hemorrhagic diathesis following a chronic disturbance of nutrition. The symptoms are the result of the particular location of the hemorrhages; the fibrous

¹ Beiträge zur Klinik der Tuberkulose, 1906, vol. lxvii.

² Riforma Medica, Naples, xxii, No. 42.

³ Berliner klinische Wochenschrift, xliii, Nr. 17.

⁴ Jahrbuch f. Kinderheilkunde, lxii, 743.

marrow is the typical and undeniable consequence of the hemorrhages into the marrow. Likewise the atrophy of the spongiosa and corticalis is the result of subperiosteal hemorrhages and especially of the hemorrhages into the marrow. Ziegler's *osteotabes infantum* is a variety of Barlow's disease in which the hemorrhages take place in an exceptional manner, being more into the middle of the diaphyses than, as is usual, into the ends of the same. Looser recommends that the term infantile scorbutus be generally adopted instead of the term Barlow's disease.

Snow¹ refers to a fatal case of infantile scurvy which at autopsy showed the presence of an extensive hematoma of the orbit. The tumor filled the entire pyramidal space behind the eye and had dissected up the periosteum of nearly the entire orbit. The clot showed the presence of large quantities of pus containing a bacillus like that of influenza. Meding² reports 2 cases of subperiosteal hemorrhage into the orbit, and calls attention to the fact that while in the adult this is always a late occurrence, in the child it is always early and may constitute the first sign of the disease. Schlesinger³ agrees that orbital hematoma is often one of the earliest lesions of infantile scurvy.

Coutts⁴ reports the pathological findings in 2 cases of Barlow's disease. In both there were extensive subperiosteal hemorrhages. In 1 case an immense blood clot filled the space between the bone and periosteum throughout the entire length of the femur, and in the detached periosteum a layer of bone had formed. In the second case there was no trace of the periosteum to be found and the profuse hemorrhages had penetrated the surrounding tissues so that the muscles were blood sodden. In this case the femoral epiphyses were detached.

Etiology and Distribution of Infantile Scurvy. Weill-Halle⁵ believes Barlow's disease to be due either to an absence of certain necessary substances from the food, or to the development of toxins in the foods. He also refers to the theory of infantile scurvy's being an acute form of rachitis, but rejects the theory, saying that, in reality, signs of rickets are rare in infantile scurvy, a conclusion which is contrary to the observations of Morse,⁶ who noted distinct signs of rickets in all but 9 of 50 cases. Morse and Schlesinger⁷ agree that the disease is due to some error of diet. Analysis of the food in Morse's cases showed that it was unsuitable and that the trouble seemed due, in part, to a lack of freshness of the food and to the heating of the same. The cases reported by Swift,⁸

¹ Archives of Pediatrics, August, 1905.

² Archives of Ophthalmology, xxxiv, 611.

³ Münchener medizinische Wochenschrift, October, 1905.

⁴ St. Louis Medical Review, March 24, 1906.

⁵ Gazette des hôpitaux, April 22, 1905.

⁶ Journal of American Medical Association, April 14, 1906.

⁷ Münchener medizinische Wochenschrift, lii, Nr. 43.

⁸ The Australasian Medical Gazette, April 20, 1906.

Steeves,¹ Snow,² and Van der Bogert³ were fed on proprietary foods, while the cases of Pagliari⁴ and Dock⁵ were fed on sterilized milk. Pagliari believes the disease is probably infectious, while errors of diet play a contributory role.

Weill-Halle⁶ states that infantile scurvy is most common among the middle and rich classes; it rarely occurs in hospitals; it is frequent in England, the United States, Scandinavia, and North Germany; it is rare in South Germany and Switzerland. The age at which it usually occurs is between five and eighteen months, especially at six months and the end of the first year. Morse's⁷ youngest case was four months old, and the oldest twenty-one months old. Three-fourths of his cases occurred during the second half of the first year of life. Schlesinger⁸ says the disease is most commonly found among the better classes and in children about eight months old.

SYMPTOMATOLOGY OF INFANTILE SCURVY. Morse,⁹ in an analysis of 50 cases of infantile scorbutus, which came under his observation, found in 40 of them errors of previous diagnosis. Pallor, often accompanied by loss of appetite, is the earliest symptom, while the tenderness or pain in the legs or back on being handled is usually the first sign to attract attention to the true nature of the affection, but this tenderness or pain may be preceded by swollen and purple gums or hematuria. Hematuria occurred in a special group of cases and was the only symptom of scurvy in 2 of them, while it preceded other symptoms in 2. Tenderness or pain on motion usually develops sooner or later and is accompanied in about half the cases by swelling about the diaphyses. The legs are involved three times as frequently as the arms. The gums are affected in about one-half of the cases always when teeth are present, and very rarely when they are not. Hemorrhages aside from the subperiosteal form are uncommon. The order in which the symptoms develop and the intervals at which they make their appearance vary materially. The outset may be very sudden or very insidious. Mild symptoms may persist in some cases for weeks and even months before the development of others; while in other cases severe symptoms may appear together or in rapid succession, the typical picture of the disease being developed in a few days.

Schlesinger¹⁰ remarks that exophthalmos may give the first warning of the incipient disease. Hemorrhages into the gums occur only when teeth have been cut. Infantile scurvy is preceded by enteritis in about one-fifth of the cases. When the disease is at its height, profuse sweating

¹ Loc. cit.

² Loc. cit.

³ Journal of the American Medical Association, December, 1906.

⁴ Rivista di Clinica Pediatrica, May, 1905.

⁵ Journal of the American Medical Association, January 27, 1906.

⁶ Loc. cit.

⁷ Loc. cit.

⁸ Loc. cit.

⁹ Loc. cit.

¹⁰ Loc. cit.

of the occiput, rapid action of the heart, and albuminuria are often noted.

Weisz¹ reports a very unusual case in which a child four and one-half months old showed a painless, red swelling about the size of an orange on the right cheek. On aspirating there was obtained a completely fluid and sterile blood. The swelling proved to be a subperiosteal hematoma of the upper jaw. There was a hemorrhage beneath the right lower eyelid, others were beneath the skin of various parts of the body, and under the mucous membrane of the mouth.

Snow² tells of a child born of healthy parents and after normal labor, which developed scurvy after having thrived on cereal milk for nine months. There was noted at this time a gradually developing paralysis of both lower limbs. In a few weeks a slight protrusion of the left eyeball appeared, and the lids became blackened. Ten days later there occurred a sudden and extreme protrusion of the right eyeball; both lids were swollen and appeared bruised. Four days afterward the child developed fever and looked very ill. On examination the child showed great apathy, slight rachitic rosary, very marked proptosis of right eyeball, with cloudy cornea, moderate protrusion of left eyeball, swollen and discolored lids, gums slightly swollen and of a violet hue; no teeth, painful and uniform swelling of the legs below the knees, edema of the feet, no purpuric spots or heat of surface. Orange juice, fresh milk, and stimulants were administered, but the child grew progressively worse, the temperature went up to 107.5° F., and death followed. In Dock's case there was bright-red blood in the stools for a while, and then for two or three weeks the stools were almost black. This case showed very slight prominence of the eyes and swelling and discoloration of the lids. Both the upper and lower extremities were involved.

TREATMENT OF INFANTILE SCURVY. As to treatment Schlesinger³ says that rapid improvement follows the substitution of raw milk for the unsuitable food. The case of Weisz⁴ recovered on being fed from the breast. It refused orange juice. According to Morse⁵ treatment consists of a proper diet and the administration of at least one tablespoonful of orange juice a day. He considers two tablespoonfuls daily ample to effect a rapid cure. Weil-Halle⁶ advises a change of food and the addition of orange juice to the diet. He says that a child of eight months can take three teaspoonfuls of cream daily along with mashed potato and beef juice; but when cure is effected this diet can no longer be tolerated and must be withdrawn. He advises immobilization of the limbs to prevent fractures, and plenty of fresh air and sunshine to combat the anemia.

¹ Archiv f. Kinderheilkunde, xli, Nrs. 1 und 2.

² Loc. cit.

³ Loc. cit.

⁴ Loc. cit.

⁵ Loc. cit.

⁶ Loc. cit.

As a prophylactic measure, mothers should be warned against the use of prepared foods and sterilized milk. When a child reaches the age of eight or nine months, some antiscorbutic, such as orange juice, fresh fruit, or potato, should be added to its diet.

Swift¹ reports two complete cures from the administration of fresh meat juice, potato, and fresh, unboiled cows' milk. Change of diet to plain milk and the administration of fruit juice effected a cure in Pagliari's² case. Dock³ used orange juice with a milk and cream mixture successfully. Still⁴ advocates the use of potato, which he believes of great value as an antiscorbutic. However, on account of its being more apt to cause digestive disturbances, it is less well fitted for use in prolonged cases than fruit juice. In preparing the potato, it should be carefully boiled or steamed so that it becomes floury. The outer, floury portion is then beaten up with enough milk to make a smooth cream; this requires about two heaping teaspoonfuls of potato to the ounce of milk. One and one-half to two teaspoonfuls of this mixture are given three or four times a day. After two or three weeks this amount should be gradually reduced so that at the end of four weeks it may be withdrawn altogether. If given with the food it should be mixed with only a portion, so that, in case the child does not take all its nourishment the full amount of potato cream will be received. The potato may in some cases be given separately. In addition to the potato cream two teaspoonfuls of raw meat juice may be given three or four times a day, and sometimes one-half teaspoonful of orange juice may be given two or three times daily. If the bowels are loose the physician should hesitate about administering these additions to the potato cream. The diet should consist of milk heated to just short of the boiling point and diluted with water.

In a case upon which Riese⁵ was called to operate for a supposed multiple osteomyelitis, the condition of the mouth revealed the true diagnosis—that of infantile scurvy. He cut down to the periosteum and released the large collection of blood, and then tamponed. The child, a male of fourteen months, showed immediate improvement, the fever subsided, and the small wounds healed rapidly. A Röntgen examination made of the case some time after showed the bone to be sound, and revealed no trace of the former trouble. Heubner also reported favorable results in a case somewhat similar upon which he operated on a mistaken diagnosis (sarcoma).

¹ Loc. cit.

² Loc. cit.

³ Loc. cit.

⁴ British Medical Journal, July 28, 1906.

⁵ Deutsche medizinische Wochenschrift, xxxii, Nr. 21.

DIABETES.

Etiology. The literature on diabetes during the past year has been, as usual, prolific; but very little advance has been made as to the etiology of the disease, though a little has been added to our means of treatment. Among the opinions advanced by recognized workers in this field is that of Pavy.¹ He reviews the mooted question of the origin of the sugar in human diabetes and again emphasizes the view so long held by him and his followers in opposition to that originally proposed by Claude Bernard. In contrast to the latter's views Pavy claims that in diabetes the sugar in the portal blood in excess of 2 per cent. is stored in the liver as glycogen and subsequently used as the economy demands it. Pavy reiterates that his theory is further corroborated by the modern view of ferment action. He believes that to keep sugar out of the urine it must be kept out of the general circulation, and this necessitates that the carbohydrate food should be dealt with by assimilation before the opportunity is afforded it to reach the systemic blood. He contends that at the site of absorption in the alimentary canal the carbohydrate is assimilated by synthesis into proteid through the instrumentality of the lymphocytes of the villi and also by conversion into fat through the agency of the epithelial cells of the villi. The portion which escapes this action is conveyed as sugar to the portal vein and transferred in the liver into glycogen. A failure of assimilation thus overloads the portal blood with sugar and it is here that he finds an explanation for the association of the pancreas with carbohydrate metabolism. He believes that the pancreas has an internal secretion (a co-ferment-like body) which aids in the synthesis of sugar into proteid. Absence of this leads to a failure of carbohydrate assimilation and thence to the condition met with in diabetes.

He refers to the sugar seen when an elimination of carbohydrate from the diet fails to prevent its appearance in the urine, and he recognizes a break down of tissue as the source of this, but fails to explain by what means. He concludes by emphasizing the vasomotor element in the mechanism of diabetes in general and believes it is the connecting link between diabetes and the well-recognized nervous influence in the pathology of the disease. In connection with this latter thought he cites the very frequent observation of red, beefy tongues, especially in some advanced cases, and considers the mechanism of it vasomotor, in keeping with the disturbance in part or wholly causing the disease.

In the recent numbers of *PROGRESSIVE MEDICINE* the relation of the *pancreas* to the etiology of this disease has been thoroughly discussed. Karakascheff² concludes, from the study of 9 cases of the disease ending

¹ Lancet, May 5, 1906.

² Deutsche Archiv f. klinische Medizin, lxxxvii, Nrs. 3 und 4.

in coma death, that the islands of Langerhans are not alone involved in so-called pancreatic diabetes, but that the whole parenchyma of the organ as well is more or less affected. In connection with this Marchand also admits the possibility of the entire pancreas eventually becoming converted into islands of Langerhans.

Hirschfeld¹ has observed 14 cases of catarrhal affections of the pancreas which have occurred in the course of diabetes and emphasizes the liability of this complication. He says that the catarrhal condition of the pancreas induces an acute exacerbation of the diabetic disturbances, causes local pancreatic symptoms, and may further tend to recur after apparent recovery. He adduces evidence to show that in many cases of diabetic coma some acute affection of the pancreas is probably the principal factor, and he has observed coma develop in diabetics after overexertion, influenza, or an operation. In other cases, however, when coma was supposedly "spontaneous" and had been preceded by gastro-intestinal disturbances, he was convinced that it was due to the extension of the gastro-intestinal affection to the pancreas. The more severe the diabetes, the greater the liability that the development of pancreatic colic may usher in diabetic coma, especially when the colic is unusually severe. This was the case in 2 of his series of 14. The pancreatic colic may vary in severity and may be confused with that due to gallstone, some gastric condition or even angina pectoris, but a characteristic feature is that the glycosuria is aggravated either during or following the attack. When other causes of such a disturbance can be excluded Hirschfeld thinks it safe to assume that the pancreas is involved in this way and considers it of more common occurrence than is usually recognized. He considers that the disturbance in the circulation evidenced by the absence of polyuria, even after copious ingestion of water, is the most important sign of pancreatic involvement; 3 of his patients were tested in this way, and there was found an increase of but 80 to 120 c.c. after the ingestion of 400 c.c. of water, under conditions where normal individuals showed an increase of from 130 to 300 c.c. The occasional occurrence of edema during various pancreatic conditions he regards as evidence that an involvement of the pancreas can disturb the circulation, and he is convinced that the pancreas is probably involved in every case of diabetes.

Futcher² calls further attention to the condition of *hemochromatosis*, discussed separately and at length some years ago by Opie and Anschutz, and considers especially the later stage of the disease; hemochromatosis with diabetes mellitus (bronzed diabetes).

He concludes that it is a rare disease and presents a *triad* of symptoms:

1. Pigmentation of the viscera and, in the vast majority of cases, also of the skin.

¹ Berliner klinische Wochenschrift, xlii, Nr. 52.

² Transactions of the Association of American Physicians, 1906.

2. Hypertrophic cirrhosis of the liver—very occasionally atrophic cirrhosis.

3. Diabetes mellitus—a terminal feature due to a sclerosis of the pancreas, causing destruction of the islands of Langerhans, and consequent interference with the secretion of the normal glycolytic ferment. Death occurs usually within a year after the onset of the diabetic symptoms. The balance of opinion, Fitcher says, is in favor of the view that hemochromatosis is due to some toxic agent of unknown character and origin which results in an increased destruction of the red blood corpuscles with deposition of blood pigment in the body tissues. Whether the changes in the liver and pancreas are due to the deposition of the pigment or to the same toxic agent which is supposed to cause the blood destruction is still a disputed question. It has been suggested that the excessive amount of iron in the tissues may be due to defective elimination rather than to increased formation from the blood.

As bearing on the *cerebral etiology* of some cases of diabetes, Chlumsky¹ reports a case of a girl who was rendered unconscious by a stroke of lightning and subsequently injured by the falling branches of a tree. There were several injuries, including fracture of the pelvis and severe contusions at the back. During the first few days following the injury sugar could be demonstrated in the urine. The legs remained paralyzed for some weeks and she developed a scoliosis which disappeared in a year and a half.

Treatment. Among the newer recommendations in the treatment of diabetes is *diabetin*, which is a pure crystallized fructose (levulose) entirely free from glucose. Its advantage lies in the fact that it is metabolized by other agencies than those acting on dextrose and most of the other sugars, and appears to be more completely utilized by the diabetic organism. It is recommended for nutrition as a carbohydrate and for sweetening both the food and drink of diabetic subjects.

W. Sternberg² advocates as an adjunct to the ordinary diabetic diet, and also to the diets used in the treatment of obesity, the use of *potatoes* prepared as follows: He finely scrapes raw potatoes with a grater into a vessel containing water and allows the mass to stand some time until two layers separate; below the fine potato meal containing most of the carbohydrate and above the fibrous cellulose portion of the potato. The upper part is strained through a cloth mesh, which allows the water and any fine meal still remaining to be removed. The fiber is then dried and cooked in various ways, as in the form of cakes, etc. Sternberg claims that the taste of potato is thus retained and is exceedingly gratifying to the diabetic deprived of such articles of diet, and moreover, by reason of its bulk, such a preparation is very "filling," though actually low in carbohydrate. It lends itself, moreover, to numerous combina-

¹ Zeitschrift f. Orthopaedic Chirurgie, 1906, vol. xv.

² Deutsche medizinische Wochenschrift, xcii, Nr. 27.

tions with eggs, milk, and the like, and is perhaps one of the most practical helps advanced for some time.

H. Benedict and B. Török¹ have conducted extensive and convincing experiments on the influence of *alcohol* on diabetes. As the result of their determinations of the urinary acetone, sugar, nitrogen, and ammonia, and the respiratory acetone excreted by diabetics on fixed diets with varying amounts of alcohol, they conclude that the use is most beneficial. They found that it reduced significantly the production of acetone, decreased the sugar elimination, and spared the proteid consumption better than does fat.

On a flesh-fat diet with great production of acetone bodies and the imminence of coma, it is possible to replace with benefit a part of the fat in the diet by alcohol. Benedict and Török state that it is impossible to lay down rules for its administration, as that may vary in every case; but they advise from 40 to 80 grams daily (contained respectively in 0.5 litre or 1 litre of Rhine wine [$\frac{1}{2}$ to 1 quart]), and the larger amount has been successfully given to cases on a severely restricted diet for weeks and months.

Sugar free or a very dry champagne, beer poor in extract, and rum taken in tea can enter into the diet in lieu of wine; and the authors find that diabetics show a great tolerance for the drug, analogous to that shown toward opium. They experience, much less readily than does the normal person, both its exhilarative and depressing effects. The amount best suited should be regularly determined and administered with care and not left to the patient's desires.

Benedict and Török have had frequent clinical demonstration of its palliative value in on-coming coma, and von Noorden also emphasizes this feature.

Contra-indications are usually albuminuria, especially when the alcohol noticeably increases it; neuritis; arteriosclerosis, and diabetes in childhood, which hardly ever, in any event, is permanently influenced for the better by any dietary *regime*. The authors are emphatic that the best proteid sparer is alcohol, and next in value to it is fat.

Crub² speaks of the application of passive congestion or suction as worthy of more frequent use. He also has had good results from superheated air in the treatment of *diabetic gangrene*. He applies the hot air at a temperature of 65° C. for an hour daily and has witnessed only benefit therefrom.

Thorbecke³ states, in regard to the *surgical complications of diabetes*, that the results of his experience and an analysis of one hundred and twenty-eight publications on the subject, have shown that the limits of tolerance for carbohydrates in a case of diabetes should be well

¹ Zeitschrift f. klinische Medizin, 1906, Nr. 60, p. 329.

² Münchener medizinische Wochenschrift, lli, Nr. 29.

³ Monatschrift f. Geburtshilfe und Gynäkologie, xxiv, Nr. 4.

established, the diet strictly regulated in order to reduce the urinous sugar to a minimum; and alkalies administered as a prophylactic before and after any operation on a diabetic. He advocates the use of the thermocautery in place of the knife whenever possible, in order to obviate hemorrhage. He considers that the choice of an anesthetic depends on complications of the various organs, but in any event more than 4 grams of ammonia in the urine constitutes a contra-indication to general anesthesia. Coma followed the administration of spinal anesthesia in the only case, a severe one, in which it is reported to have been used.

As indicating a remote but possible danger in the *dietetic treatment* of this disease, W. E. Jones¹ reports a case of *scurvy* occurring in a diabetic, who had persisted for a period of twenty months in an antidiabetic diet recommended by a friend. The patient ate daily from two to four eggs, two pounds of fried or minced beef, and drank two quarts of water with real improvement of his diabetic symptoms and a gain of weight, for a period of twelve months. He had also occasionally added cautiously a little fish and toast or diabetic bread. The urine remained free from sugar, but he shortly began to fall off, developed subcutaneous hemorrhages, universal pains and aches, and bleeding of the gums on mastication, together with other symptoms of scurvy. He was therefore allowed as plentiful a supply of such fresh vegetables as a diabetic should have, and four ounces of lime juice daily, and the beneficial effects were remarkable, even within a few days. The patient eventually returned to his condition before the onset of the scorbutic symptoms, and Jones says that the character of the lesions, the history and the rapid recovery on antiscorbutic diet make the case clearly one of scurvy complicating diabetes as a result of a too rigid diet.

The most significant work in connection with diabetes has been the application of the brilliant discovery of *secretin* by Bayliss and Starling² to the therapy of this disease. It is as yet entirely on probation, but some of the results obtained give great promise.

Bayliss and Starling demonstrated that when hydrochloric acid comes in contact with the epithelial cells of the duodenum and upper part of the jejunum, a substance is formed which acts as a stimulant to the external secretion of the pancreas. It reaches this organ through the blood and has been given the name of secretin by its discoverers. In health this exciting agent is formed by the passage into the duodenum of the acid chyme from the stomach, and the idea has been promulgated that it is possible, since secretin acts as a stimulant to the visible external secretion of the pancreas, that it may act analogously on its glycolytic function, the so-called internal secretion, as yet little understood. By many it has been supposed that the internal secretion is formed in the

¹ British Medical Journal, January 26, 1907, p. 197.

² Recent Advances in the Physiology of Digestion, E. H. Starling, Pub. by W. T. Keener & Co., Chicago, 1906.

cell islets of Langerhans, but this appears to be by no means certain. It has been shown by Dale, who believes these islets to be derived from the ordinary alveolar cells, that there is to be found every transition stage between the alveolar cells and the islets. Moreover he has shown that the proportion of islet tissue can be much increased by prolonged stimulation of the gland by secretion and he regards the islets as cells in a state of exhaustion.

If therefore there is only one type of secreting cell in the pancreas to elaborate both the external and internal secretions, it would appear reasonable to presume that both secretions might be stimulated by the same excitant.

A paper on the treatment of diabetes by *acid extract of duodenal mucous membrane* was recently published by Moore, Edie, and Abram.¹ As these authors point out, even if it be granted that the duodenum yields a chemical excitant for the internal secretion of the pancreas and that in the absence of this internal secretion, glycosuria occurs, there are three places at which a breakdown may occur, resulting in diabetes:

1. At the duodenum, on account of the non-formation of the excitant.
2. At the pancreas.
3. In the oxidizing tissues, such as liver and muscle. There is a pathological basis for this last suggestion in the association of diabetes with cirrhosis of the liver in certain cases.

Of these three possible conditions which may cause glycosuria, in only one would the secretin extract be of any service as a therapeutic agent, namely, when the function of the duodenal cells is so disturbed that insufficient pancreatic excitant is secreted. It must not therefore be supposed that all cases of diabetes will be benefited by the administration of secretin.

In Moore's paper above referred to, 5 cases were treated with secretin; in 2 the results were negative, but it is stated that the periods of observation were short and the doses insufficient. In a third case, a man of twenty-five, the sugar fell in amount and gradually disappeared entirely after administration of the extract for some weeks. The patient subsequently developed phthisis, the sugar reappeared, and he shortly afterward died. In 2 other cases, a boy of seven and a girl of nine, the sugar excretion fell until after three weeks treatment in the latter case and five and a half weeks in the former case, it disappeared entirely and remained absent even after cessation of treatment. Nellis B. Foster² states that he learned from a personal communication to him from Moore, that one of the above patients who was apparently cured relapsed since the publication of Moore's paper.

J. R. Charles³ reports 3 uncomplicated cases of diabetes in which

¹ Biochemical Journal, 1906, vol. i, 28.

² To be quoted later.

³ Bristol Medico-Chirurgical Journal, 1906, xxiv.

secretin was used while the patients were on a constant diet. His results were entirely negative, but, as he pertinently remarks, it is as yet uncertain what type of the disease is likely to respond to this measure and further observations alone will elucidate this fact. Moreover the most satisfactory results obtained by Moore, Edie, and Abram were in children, whereas Charles' patients were all adults.

Despite the frequent severity of the disease in early life, it is conceivable that the pancreas is then more susceptible to stimulation than later. The preparation of the intestinal extract is also a possible source of failure, since perfect uniformity of technique by all workers can hardly be looked for at this early stage, though Charles states that he followed Moore's directions.

Among the most careful work with secretin in the therapy of diabetes is that reported by Nellis B. Foster,¹ who watched his patients first during (a) a period of unrestricted diet to ascertain the quantity of sugar ordinarily excreted; (b) a period of carbohydrate-free diet when meat, fat, and sugar-free green vegetables were allowed; and (c) period during which was determined the effect on the urinary glucose of small amount of such carbohydrate as bread, potato, or milk; with estimations of the sugar in twenty-four-hour specimens. The method of preparation of the secretin used was that adopted by Moore, which Foster describes as follows: Two feet of the duodenum of pigs freshly killed, using sections from about twenty-five intestines at each preparation, were washed with physiological salt solution and the mucosa lightly scalped off with a horn spatula. After passing the mucous membrane through a fine hashing machine it was mixed with an equal volume of 4 per cent. hydrochloric acid, ground in a mortar, then transferred to a casserole and slowly heated to boiling. After filtration through cheese-cloth the filtrate was reduced in acidity by nearly neutralizing it with sodium hydroxide. It was then sterilized in flasks and was ready for use, though a fresh quantity was prepared every three days. The dose employed was an ounce of this extract by mouth a half-hour after meals.

Foster reports 5 cases entirely without favorable results, and finds his results in accord with the observations of Spriggs, who originally suggested this application to diabetes.² Foster insists, however, that these negative results do not exclude the possibility that there are cases which might respond to this method of treatment. He emphasizes the fact that the morbid changes in the pancreas which can be detected by our present means are absent in a large proportion of cases, and even the significance of what has been held to be a pathological process in the islands of Langerhans has been questioned.

Bainbridge and Beddard,³ after using secretin in 3 cases, conclude:

¹ Journal of Biological Chemistry, January, 1907.

² Cited by Moore, Bio. Chem. Journal, 1906, i, p. 30.

³ Ibid., vol. i, Nos. 8 and 9, pp. 429 to 446.

"The administration of secretin by mouth had no influence whatever upon the output of sugar in the urine." In some further investigations on pro-secretin the precursor resident in the epithelial cells of secretin, Bainbridge and Beddard find that in only 1 out of 6 cases of severe diabetes was pro-secretin present in an amount approximating to the normal. This observation suggests that in certain diabetics secretin may play an important part in the etiology of the disease and likewise calls up many questions for solution.

So it is seen that, despite many negative results, the advisability of further investigation along this line of treatment is warmly advocated even by those who have themselves failed of success in its adoption. Some basis for their optimism is afforded by the following work of Dakin and Ransom, which is the most recent favorable report to date.

H. D. Dakin and C. C. Ransom¹ make a note on the treatment of a case of diabetes mellitus with secretin. They observed a married woman of forty-five who for several years had experienced intermittent attacks of severe pain in the epigastric region. There was present a well-defined and easily palpable mass in the region of the pancreas. After other possibilities had been duly considered, the condition was confidently diagnosed as pancreatic disease. The attacks of pain had caused a great loss of weight and the patient was generally in poor condition, but subsequently a great improvement took place and at the time that treatment with secretin was commenced she appeared fairly healthy and well nourished. About four years previously a large amount of sugar was detected in the urine, which could not be materially reduced by dieting and for some time before the treatment commenced the patient was in the habit of daily excreting about three liters of urine containing 7 to 8 per cent. of sugar. During the whole time of treatment with secretin and for some months previously the patient was on a restricted but not a carbohydrate *free* diet and *no drugs* were used. The secretin was freshly prepared three times a week from the upper six feet of the small intestines of freshly slaughtered pigs; the details of preparation were invariably those adopted by Bayliss and Starling,² and by Moore,³ and the use of secretin was maintained during twelve weeks. As a result of treatment there was but little change in the sugar excretion during the first fortnight, but in the third week a distinct decrease was observed. This decrease in sugar which was accompanied by a diminished output of urine, was continued, until after five weeks the original sugar excretion was reduced by one-half. At this point the patient had a seizure of acute pain, which was referred to the pancreas and which differed from the previous attacks only in its increased severity. After a few days the pain disappeared, but the sugar excretion gradually rose despite the continued use of secretin in increased doses until practically the

¹ Journal of Biological Chemistry, January, 1907.

² Loc. cit.

³ Loc. cit.

original output of sugar was reached. During the latter part of the period of observation the urine contained a large amount of aceto-acetic acid and acetone. Dakin and Ransom say that these results show that though it is probable that the use of secretin resulted in a diminished sugar excretion, the diminution was not permanent nor was it nearly so marked as in the case described by Moore.

It therefore still remains for further experimentation to determine to what extent, if at all, this most suggestive observation of the influence of secretin on pancreatic activity is applicable to the supposed glycolytic function of the pancreas, and hence to the treatment of diabetes mellitus. We are justified at the present time in believing that this work, or some elaboration from it, will be ultimately of real value and will, perhaps, throw much light on the etiology of certain forms of this disease.

Diabetes Insipidus. Some little attention has been paid to diabetes insipidus during the past year, Spaether¹ reporting a case of this disease favorably influenced by *strychnia*. His case followed an injury to the head and he suggests that the trauma might have affected the vasomotor centres governing the circulation in the kidney, with polyuria as a result. The *strychnia* favorably affected these centres and had thus indirectly benefited the conditions.

Kelly² reports several cases of diabetes insipidus which improved under the injection of strychnine nitrate. He began with 0.5 mg., increasing every second day by 0.1 mg. to a maximum of 0.01 gm., and noticed improvement in the polydipsia as well as the polyuria. The favorable reports on this procedure will doubtless lead to its wider adoption.

Schmidt³ advocates treatment by active purgation of those cases of diabetes insipidus accompanied by a dry skin and constipation. He uses podophyllin in quantities of about fifteen grains divided up into forty doses so that the patient gets one or two pills a day. At the same time he promotes free diaphoresis by sweat baths, the object being in each case to deplete the congested kidneys by the artificially induced hyperemia of the bowels, thus giving the atonic vessels a chance to recover. The revulsive effect of the hot bath acts perhaps analogously. Schmidt has been struck with the frequency of constipation in certain cases of diabetes insipidus, and finds that with the above treatment the subsidence of the polyuria is pronounced.

¹ Berliner klinische Wochenschrift, xliii, Nr. 29.

² Therapie der Gegenwart, xlvii, Nr. 3.

³ Wiener klinische Wochenschrift, xviii, Nr. 37.

GOUT.

The subject of gout has apparently had very little attention for a year past; and, in addition to a great paucity of literature in a field usually prolific, there have been few contributions of note as to the nature of the disease.

As the result of experimental investigation Van Loghem¹ concludes that uric acid and sodium urate are both soluble in the body fluids of the rabbit and the dog, uric acid to a greater degree than its salt. He finds that alkalies taken internally favor experimental deposition of the urates, while acids prevent it, and on this account he suggests the possibility of hydrochloric acid being used for a rational prophylaxis of the formation of urates in man. Falkenstein² also recommends a trial of hydrochloric acid in this condition, while Hapeland has recently advocated the internal use of sulphur and guaiacum. Siebergleit³ has repeated the experiments of Van Loghem and finds, with him, that hydrochloric acid given by mouth hinders the conversion of uric acid into acid sodium urate, if the uric acid be injected under the skin or into the peritoneal cavity. Silbergleit destroyed the kidneys of fowls by injection of potassium bichromate. In this way he caused in the tissues deposits of the uric acid which would naturally be excreted in the urine. In the fowls to which hydrochloric acid was given no deposits of uric acid developed, while in those to which no acid was given abundant deposits were found. He has also repeated Van Loghem's experiments on rabbits with the same result. The uric acid is more slowly dissolved than in the control animals and the formation of sodium urate apparently prevented. This work is suggestive, but needs to be carried further before its real meaning is clear.

Richartz⁴ lays some additional emphasis on the so-called "visceral gout, though advancing nothing new, by citing 2 cases, 1 of which, in a man of sixty-three, was accompanied by loss of knee-jerk and had been diagnosticated by Charcot as a case of tabes with gastric crisis. The case was of twenty-two years' duration, but owing to the presence of a small nodule resembling a tophus and the occurrence of the murexid reaction in crystals found in the blood just after an attack, together with the observation of a high percentage of uric acid in the urine, the patient was placed on a purin-free diet. There were no further attacks. Another case cited illustrated the same principle except that chronic joint pains were temporarily relieved by periodic attacks of epigastric pain and vomiting followed by a depression of several days' duration.

¹ Deutsche Archiv f. klinische Medizin-Leipsic, lxxxv, Nrs. 3 und 4

² Berliner klinische Wochenschrift, xlviii, Nr. 8.

³ Therapie der Gegenwart, xlvii, Nr. 8.

⁴ Deutsche medizinische Wochenschrift, xxxii, Nr. 22.

This patient also experienced rapid and pronounced improvement when following a meat-free *regime*.

Podak¹ showed by experiments that alcoholic subjects eliminate uric acid after ingestion of 20 grams nucleic acid, with the same tendency to retention and delay in elimination which has hitherto been thought pathognomonic of gout. In experiments conducted by him on individuals placed upon fixed diets, a healthy person eliminated on the first day 0.558 gram; a patient with gastric ulcer eliminated on the first day 0.425 gram; a gouty patient eliminated only 0.198 gram, and three hard drinkers eliminated amounts varying from 0.055 to 0.387 gram, so that they showed the diminished output of gouty subjects. This observation, if confirmed, is again suggestive and may prove a link in the chain of evidence concerning gout and a possible alcoholic etiology.

OBESITY.

A number of investigators and clinicians during the past year have devoted attention to the question of obesity, most conspicuous among whom are Labbé and Furet,² who report the results of their investigation on the cause of obesity. This is the most signal contribution to the subject for some time, and, while not necessarily conclusive, seems to throw some light on the mechanism of the disease. The subjects of their investigations were 2 obese men whom they placed upon "weighed and measured diets." They then determined at various intervals the weights of the men and the balance between the amounts of chlorides and water ingested and the amounts of the same egested through the urine. They say that if a curve of weight be drawn from regular and daily observation of an obese person, he can be classed in one of three categories according to the stage of the disease:

1. His obesity is in process of being established, and he increases regularly in weight.
2. His obesity is already developed, and the variations of his weight are of little importance—the stationary period of obesity.
3. For one reason or another the patient grows thinner temporarily or permanently, and his weight diminishes more or less rapidly.

The first two periods are those most frequently seen. From the figures and charts obtained, Labbé and Furet draw the conclusion from these 2 cases of obesity, which they followed closely for a long period, that there is in this disease a considerable retention of chlorides and a fixation of them by the organism. In common with other authors, P. Courmont and Nicolas³ and Ambard and Beaujard,⁴ they have observed

¹ Deutsche Archiv f. klinische Medizin, lxxxviii, Nrs. 1 und 3.

² Revue de médecine, xxv.

³ Société médecin des hôpitaux de Lyon, June 21, 1904.

⁴ Semaine médicale, 1905, No. 12.

in certain pathological subjects the retention of chlorides within the organisms without an increase of weight, that is to say, without increase of water; but Labbé and Furet also find intermittence of the phenomenon. They think it easy to explain this fact. If the organism retains a certain portion of chlorides brought to it by food, as is the case with the obese, and if it does not retain water analogously, there must necessarily occur an increase in the molecular concentration of the fluids of the body in general. We know that this chemical quality of the body fluids can vary within certain limits; but having passed those, the equilibrium of the body fluids becomes unstable and then tends back toward a more or less fixed mean. This is the case with the obese. There are periods when they accumulate salt to the extreme limit of molecular concentration of tissue fluids; then succeeds another period, but this is not one of elimination of the excess of salt because such patients are unable to do so, as a sound subject accidentally "salted" would do. The only mechanism which they have at their disposal to deplete the tissue of salt is to increase their liquid volume, that is, to retain water. This second period shows itself practically by an increase in weight.

While it has been found in health that there is a close relation between the amount of water and the amount of chlorides eliminated, Labbé and Furet emphasize the fact, as shown by their observations, that there is no such consonance in obesity. If one diminishes, for twenty-four hours, the ingestion of chlorides, there is not produced a proportionate diminution in the elimination of chlorides. On the contrary, there is often a relative and sometimes an absolute increase. The obese seems to have a tendency to eliminate chlorides if put on a *regime* poor in salt; and it is characteristic of the condition that the elimination bears no direct proportionate relation to the ingestion. With the ingestion of moderate or large quantities, the elimination remains low. With the ingestion of small quantities, the elimination tends, temporarily at least, to remain high.

On the basis of the above conclusions the authors depreciate the value of dry diet, so prevalent now in the treatment of obesity. They show that it tends to a maximum dehydration of the tissues and consequently to their maximum chloridization, with the accompanying accidents so frequently seen clinically in connection with both heart and kidneys as a result of superconcentration of serum and lymph. As to the efficiency of a dry diet, Labbé and Furet insist that it is illusory and moreover is a source of great danger. On the contrary, the abstention from chlorides with normal, or even abundant, ingestion of fluids, produces regular and permanent results. In this regimen the organism receiving no more chlorides, eliminates them more and more and retains but a minimum. To maintain its molecular concentration constant, the body must then reject a maximum of water, and as long as the "cure" lasts this equilibrium necessarily persists, without injurious

action upon the economy. It is understood, of course, Labbé and Furet remark, that this plan of treatment constitutes but one of the elements in the cure of obesity, and that the others lie in a carefully calculated restriction of diet and in a hygienic life, without which any therapy is of no avail.

Van Noorden¹ sums up the factors of most importance in the treatment of obesity, and very pertinently remarks that it is not the four weeks of the "antifat cure" which determines the ultimate success of the treatment, but the forty-eight weeks of the remainder of the year, which the patient passes at home or elsewhere left to his own devices. For this reason the "cure" should be taken at a sanitarium, as the patient then, instead of slavishly following the physician's directions, obtains a clear insight into the duties which are imposed on him by a regard for his future health. Van Noorden thinks muscular exercise the main feature of treatment, and mountain climbing the best of all forms, since it can be graduated; rowing comes next. Horseback riding, which is excellent to stimulate the intestines, is of no use in reducing obesity; and the use of gymnastic apparatus and massage is only for those too weak for out-of-door exercise. Some of the antifat remedies advertised contain thyroid extract, which has an unmistakable action in reducing obesity; but its advantages are more than counterbalanced by its frequent toxic action. Courses of mineral waters are beneficial, though not so much from the water *per se* as from the promenading, the climatic factor, the restricted diet, etc. Van Noorden concludes that while sweat baths, electric light, and sun baths do not directly affect obesity, they may nevertheless be useful as part of a regimen; and he has the same attitude toward the eating of smaller meals at shorter intervals, and the reducing of the intake of fluids. These latter factors, in his opinion, are of no practical importance whatever in the reduction of obesity, and are of use only in so far as the patient has less appetite on a dry diet frequently administered.

Orgler² recommends potatoes and fluids in abundance, with avoidance of fat and sauces. Under these restrictions an obese boy lost ten pounds in the course of a month. However, care was taken to see that the nitrogen balance was maintained at all times.

Wainwright³ reviews the subject of the treatment of obesity and emphasizes the fact that this condition cannot be successfully controlled by the same or similar methods in every case. Corpulent persons, who are otherwise healthy, by careful dieting, plenty of exercise, baths, and other rational means, may reduce their superabundant adipose deposit, or at any rate prevent an increase of it. But Wainwright insists that obesity is a disease and not a symptom, and that the treatment of the

¹ Berliner medizinische Wochenschrift, xxxi, Nr. 19.

² Jahrbuch f. Kinderheilkunde, lxi, Nr. 1.

³ Medical Record, December 9, 1905.

obesity alone may and probably will have an injurious effect on the patient's general condition. The cause must be treated, and the attempts to reduce flesh must be governed by the disease with which the patient is suffering.

In connection with dietary advances in the treatment of obesity, may be mentioned the preparation of a palatable and filling form of potato, which is low in carbohydrate. Details of this can be found under the heading of *Diabetes* in this volume of PROGRESSIVE MEDICINE.

Rheinboldt¹ gives the details of 4 cases of obesity in which thyroid treatment was given, supplemented by copious ingestion of albumin, to supply the demands of the consequent overnutrition. While the thyroid extract is being taken, he assumes that about 3000 calories above the ordinary are required; and if this extra supply is not given from without the patient's own albumin is drawn upon and his general health suffers. In the 4 cases described the treatment proceeded without the slightest by-effects, which Rheinboldt considers a confirmation of his theoretical reasoning. He urges that the thyroid treatment should be begun very gradually, and that the dose always be restricted to the effectual minimum. The tablets must be thoroughly chewed. At least 20 per cent. of the calories needed should be supplied in albumin, preferably meat. In his experience the elimination of water was much promoted by the thyroid treatment. Experiments conducted by him on dogs showed the marked efficiency of the glandular extract in reducing the animals' weights.

MYXEDEMA.

During the past year 3 cases of myxedema have been reported, and several articles on some phase of the disease have been published. Harvey² reports a case occurring in a woman of fifty-two. Her history showed pneumonia, typhoid fever, malaria, and rheumatism. When first seen she seemed greatly swollen and the urine was scanty, but there was no albumin present in the urine nor any pitting on pressure. Pain was severe universally, but most severe in the left intercostal spaces. She was able to walk only a few steps and then with great difficulty. She was nervous and restless, and insomnia was marked. The tongue was broad, thick, and flabby, the lips were thick, the mouth was enlarged, and there was a peculiar action of the lips and tongue in speaking. The skin of the face and hands was hard, dry, and wrinkled. The eyebrows and lashes were scanty, and the patient was rapidly becoming bald. There were marked hallucinations, the appetite was poor, and digestion was imperfect. Her temperature was 97° F. and pulse 70. The thy-

¹ Berliner klinische Wochenschrift, xliii, Nr. 24.

² Medical Fortnightly, December, 1905.

roid was completely atrophied. She was placed on thyroid extract and speedily improved and in a very short time felt as well as usual.

Fraser¹ reports a case in a man of forty-two, a carter. This patient showed the typical symptoms of the disease, including the less conspicuous ones, such as lowered temperature and slow pulse, sluggish mental processes, and recurring cramps. This patient first came under observation in 1901, and at that time had been ill for three years. He was treated with thyroid extract and soon approached the normal. A little while before the case was reported he had been unable to get either thyroid glands or the extract, and within two weeks several of the original symptoms, such as huskiness and slowness of speech, the feeling of coldness, and the swelling of the face, returned; and in a month the typical symptoms of myxedema were present again. A return to thyroid extract soon brought about a marked improvement.

Hertzler² reports a case presenting all the typical features of myxedema, and also a condition which he states he has found reported but once, namely, ascites. This patient also presented leukoplakic patches on the dorsal surfaces of the hands. He was placed on thyroid extract, and in a few days developed the signs of acute thyroidism. The administration of the thyroid was suspended, but during the period of acute thyroidism his symptoms disappeared very rapidly, including the ascites. After the disappearance of the symptoms of thyroidism his pulse was irregular, both in rate and volume, but soon became normal. He has been able to maintain his normal condition by taking 2 to 5 grains of the extract per day.

Argutinsky³ discusses the *development of the bones* and their centres of ossification in myxedema as shown by the Röntgen rays. He takes the bones of the carpus as criteria as to whether or not the myxedema is congenital. If the centres of ossification have not appeared in the bones of the carpus, he calls the myxedema congenital; for he states that centres of ossification appear in the bones of the carpus in the first three or four months of life, and if they do not appear it is evident that the myxedematous condition was present in the first months of life and is therefore congenital. He further states that by examination of the bones of the tarsus it is possible to establish whether the myxedematous condition existed *in utero*; for the os calcis and astragalus show centres of ossification at the sixth and seventh month, respectively, of fetal life. If these centres are absent at birth, it argues that some process occurred *in utero* that prevented their formation. He thinks that the retarding of the growth of the bones due to the myxedematous process ranges from the least, in the ribs, to the most, in the short bones of the extremities, the carpus and the tarsus, that is, it is most marked in those bones in

¹ British Medical Journal, March 3, 1906.

² Journal of American Medical Sciences, February, 1906.

³ Berliner klinische Wochenschrift, xliii, Nr. 38.

which normally there is the slowest development, and it is least marked in those in which normally there is the greatest development.

A. Lorand¹ ascribes *sleeping sickness* to the degeneration of the thyroid gland under the influence of the toxins of the trypanosoma.

EXOPHTHALMIC GOITRE.

While a few interesting facts have been presented regarding the pathology of Graves' disease and two new signs have been added to its symptomatology, yet the bulk of the year's literature bears on its treatment. The mass of evidence points to the thyroid gland itself as being the etiological factor in this malady; whether the process is one of hyperthyrosis or of dysthyrosis is the question most discussed.

Alt's² studies in metabolism are of interest, and further research along these lines should yield facts of importance in the treatment of this disease. Conclusions to be drawn from the reports on the employment of sera derived from the blood of thyroidectomized animals are very uncertain; however, the evidence seems to support the view that these sera are highly valuable palliative remedies. Beebe and Rogers³ report their experiments on the preparation and use of a serum which they claim has both cytolytic and antitoxic properties of a specific nature for the exophthalmic thyroid gland and its secretion.

Etiology. Dufton⁴ believes that the objective and subjective symptoms of Graves' disease point to a lesion of some of the chain of sympathetic ganglia, and this position is supported by Snives.⁵ There can be little doubt that certain injuries of the nervous system may occasion some of the symptoms or possibly even the whole clinical picture of Graves' disease just as section of the vagus may occasion pneumonia, but there is almost as little reason to believe that a nervous lesion is necessarily associated with Graves' disease as that such an association is essential in pneumonia. It is undoubted, however, that continued depression or great nervous shocks often play a part in the causation of the disease, and I have seen the complete picture of Graves' disease arise acutely in the course of a case of organic nervous disease (ascending paralysis).

Kocher⁶ quotes his own statistics (he operated on 175 cases) as evidence of the idea that this disease is due to a perverted action on the part of the thyroid gland, either a hyperthyrosis or a dysthyrosis, probably

¹ Presse médicale, No. 98.

² Münchener medizinische Wochenschrift, liii, Nr. 24.

³ Journal American Medical Association, February 17, 1906.

⁴ British Medical Journal, April 21, 1906.

⁵ St. Paul Medical Journal, November, 1906.

⁶ British Medical Journal, No. 1, 1906.

the former. The histology of the diseased gland, he says, points to an increased or altered activity of the parenchyma or secreting cells, in that these show extraordinary development as regards both size and number, and the lumina of the vesicles reveal an absence of the ordinary colloid. Another piece of evidence in this direction is the swelling of the lymphatics in the neighborhood of the thyroid. This is a pure hyperplasia, and as proof of the irritation of the lymphatic tissues he cites the lymphocytosis of 30 to 40 per cent. and even as high as 74 per cent. which occurred in his cases. The lymphocytes are often of atypical form. There was no leukocytosis, but Nageli, who made many of the examinations, found 2 to 3 per cent. myelocytes with a decrease in the neutrophils and a certain amount of anemia of the red cells in some cases; these changes were due probably to the toxic effect of the abnormally increased secretion of the thyroid in the bone-marrow. These facts, Kocher thinks, suggest the interesting analogy between severe Graves' disease and the "status lymphaticus." In both diseases operation is attended by risk of sudden death. Other points showing the increased activity of the gland are the great increase in the production of one of its specific constituents, iodine; and the fact that in any given case the degree of amelioration is in direct proportion to the amount of gland tissue put out of commission, the least improvement resulting from the ligation of one artery and the greatest from unilateral excision with resection of the upper and lower halves of the other lateral lobe.

Beilby¹ describes the changes found in the thyroid in a typical case of Graves' disease which bears out the theory of hyperthyrosis: "(1) A change of the epithelium from a low or cuboidal type to a high cylindrical form; (2) a gradual disappearance of the colloid material, which seems to be one of the earliest evidences of beginning hypertrophy; (3) alteration in the size and form of the alveoli due to the hyperplasia and unfolding of the epithelium; (4) increase in the vascular supply and in the connective-tissue stroma."

Lewis² describes the histology of primary exophthalmic goitre as an excessive epithelial proliferation with irregular follicles which are large and filled with papillary ingrowths. The epithelial cells become cylindrical in form and the secretory processes from the standpoint of histology are similar to those of the normal gland when stimulated to increased secretion by the injection of pilocarpine. Halstead and Hurtle have described the same changes in compensatory hypertrophy of the gland. When colloid is present it is the product of both secretion and degeneration. It stains faintly and is of a finely granular structure, although it may be dense and stain deeply. The gland in the secondary cases which follow simple goitre is the same histologically as the simple colloid

¹ *Annals of Surgery*, June, 1906.

² *Surgery, Gynecology, and Obstetrics*, Chicago, October, 1906.

or parenchymatous goitre. Lewis suggests that the primary cases may be associated with dysthyrosis and the secondary cases with hyperthyrosis.

The fact that Beebe¹ in his latest communication reports the possibility to developing a serum of high therapeutic efficiency from proteids of the normal gland would indicate that there is no special toxin in the pathological gland and that the disease is due to excess of function rather than a complete change in the secreting activity.

Slatincano² was unable to produce changes in the thyroid epithelium by using a cytolytic serum from animals immunized against normal thyroid tissue. Small doses led to enormous overproduction of colloid substance with diminution in the volume of epithelial cells. Large doses gave rise to some necrosis of the epithelium. Injections of the serum into the carotid produced necrosis of the epithelium and disappearance of the colloid on the same side and on the opposite side disappearance of the colloid alone.

As against the theory of hyperthyrosis Holub³ reports a family in which one daughter showed undoubted features of both Graves' disease and myxedema; another suffered from Graves' disease; two other sisters exhibited struma with tachycardia; another sister showed thyroid enlargement, very slight tachycardia, and very slight tremor; the mother had a moderately large goitre without symptoms. The cases of this series, where treatment was indicated, were influenced in a remarkably favorable manner by the administration of thyroidin tablets. Holub lays stress on the fact that the occurrence of both Graves' disease and myxedema in the same patient at the same time precludes the idea that the former is due to a hyperthyrosis and the latter to a hypothyrosis; likewise that an amelioration or cure resulting from the administration of the normal secretion of the gland speaks against the theory of hyperthyrosis. Holub believes these two facts favor the theory of a dysthyrosis with which there often develops a hyperthyrosis.

As I have already pointed out⁴ the anatomical changes encountered in typical Graves' disease are not always identical. Furthermore, we must recognize that, in some cases of so-called simple goitre imperfectly developed, symptoms of Graves' disease sometimes present themselves. It seems evident, then, that the syndrome which we designate under the name of Graves' disease represents the reaction of the system to the excessive thyroidal secretion incident to possibly varied forms of disease of the gland.

The relation of the parathyroids to the disease is still subject for discussion. According to Susena⁵ removal of the parathyroids is followed

¹ Journal American Medical Association, September, 1, 1906.

² Comptes-rend. de la Soc. de biol., lix, No. 76, 1906.

³ Wiener klinische Wochenschrift, xix, 566.

⁴ Pennsylvania Medical Journal, December, 1906.

⁵ Riforma Medica, Naples, xxii, No. 6, 1906.

by severe intoxication, which is reduced if shortly afterward the thyroid is excised or its circulation temporarily obstructed. Reduction of the intoxication also follows the ingestion or transplantation of parathyroid tissue or the injection of parathyroid extract. Park¹ believes that the parathyroids should be suspected of playing an important role in the disease, but that our knowledge has not reached a point where we can make much practical use of it. Ewing² believes that there is too little evidence to warrant us in attributing to these glands any essential role as a causative factor.

Wurde mann and Becker report an atypical case of exophthalmic goitre in which there was an endothelial degeneration of the hypophysis cerebri without signs of acromegaly. Ewing,³ however, believes the hypophysis of little importance in relation to Graves' disease.

Bernhardt⁴ reports a case in association with *cervical ribs*, as well as a man and wife who were subjected to the same conditions of overwork and sudden marked changes of temperature, both of whom developed Graves' disease. He suggests that these conditions may have some possible etiological bearing.

Symptoms. Thompson⁵ has analyzed 80 cases showing the cardinal symptoms, and calls attention to the frequent occurrence of acute febrile disturbance accompanied by cardiac dilatation and very commonly associated with tonsillitis, which he believes may induce the exacerbations by increasing the activity of the gland. One-fourth of the cases gave a history of tonsillitis or quinsy, and in 10 others there was a history of some acute infection of the respiratory tract.

Kocher⁶ says he has never seen a case of Graves' disease without alteration in the thyroid gland. There is always some swelling. The vascular phenomena, consisting of dilatation of the vessels, especially the arteries, with a characteristic bruit and often a thrill, are to be observed very early. When exophthalmos is present at the early stage of the disease, as it often is, he holds that the term exophthalmic goitre is misleading and may cause the practitioner to overlook the first symptoms of the disease when treatment might have an excellent effect. And, further, exophthalmos occurs in connection with goitre when Graves' disease is not present; hence the term exophthalmic goitre should not be used at all. Kocher would not accept a diagnosis of Graves' disease in the absence of characteristic thyroid enlargement and the vascular symptoms at the beginning. He adds another to the group of ocular signs connected with this disease, stating that when a patient is made to look steadily at you or to look upward suddenly there is a momentary retraction of the upper lid.

¹ Medical Review of Reviews, July and August, 1906.

² New York Medical Journal, December 1 and 8, 1906.

³ Loc. cit.

⁴ Berliner klinische Wochenschrift, xliii, Nr. 27.

⁵ American Journal of the Medical Sciences, December, 1906.

⁶ Loc. cit.

There is a class of cases referred to by Fischer¹ which are in reality Graves' disease. Neither the exophthalmos nor the thyroid enlargement is marked, and the former may be absent. The patients are usually women who have some genital disturbance. They sometimes have gastro-intestinal attacks, with vomiting, diarrhea, etc., but their chief complaints are attacks of palpitation, nervousness, and a feeling of uncertainty which may come on suddenly and without apparent cause.

Warden² reports 2 cases typical of this class and emphasizes the importance of more careful observations of the relationship between certain cases of paroxysmal tachycardia and exophthalmic goitre. He is inclined to regard this symptomatic disturbance as not having a definite entity. In both of Warden's cases the attacks came on sometimes without apparent cause and sometimes as a result of fatigue. The heart in each case showed enlargement.

Dernine³ calls attention to the sensitiveness of the heart to fatigue in Graves' disease; being without reserve energy it soon becomes exhausted and enlarges.

I have seen cases of mitral disease with *hypertrophy of the heart* develop acute cardiac symptoms and at the same time enlargement of the thyroid gland, exophthalmos, and other signs of Graves' disease. Under cardiac medication the acute symptoms of the heart improved, together with a disappearance of the thyroïdal trouble. That these results are only infrequent consequences of cardiac disease may be due to the fact that specially favorable vascular conditions are necessary. Also most cases of pronounced chlorosis that have come under my observation have had more or less fullness of the neck, in some instances sufficient to constitute an actual goitre accompanied by marked palpitation, tremor, a tendency to relaxation of the skin, and even prominence of the eyeballs.

Treatment. The literature of the year on the therapeutics of Graves' disease may be considered under five headings: general; medicinal, including dietetic measures; serum therapy; radiotherapy, and surgical interference.

Chenhall⁴ advises the free administration of belladonna along with rest and liberal diet. The beginning dose of succus belladonnæ to be five minims three times daily, which is increased one minim each day until the tenth day the maximum of fifteen minims is reached. The full doses are continued for twelve days and then gradually reduced until at the end of six weeks the drug is abandoned. He believes the drug worthy of confidence in these cases, but in no case a specific.

Schlesinger⁵ vouches for the therapeutic value of phosphorus in this affection. His dose is half a milligram in pill form twice daily.

¹ Münchener medizinische Wochenschrift, liii, Nr. 32.

² Journal of the American Medical Association, January 13, 1906.

³ Riforma Medica, Naples, xxii, No. 43.

⁴ Australasian Medical Gazette, xxv, 281.

⁵ Medical Press and Circular, October 17, 1906.

Alt¹ also insists upon the administration of phosphorus in exophthalmic goitre because of the abnormally great elimination of this element in the urine of his cases. In his metabolic work he found that exophthalmic patients improved on a salt-free diet and that they demanded two or three times the normal calories. He supplied a large amount of calories in the form of albumin and fat; milk, cream, unsalted butter, rice, meat, eggs, and fish were mainly relied upon. The patients all gained in weight and the symptoms subsided to a remarkable extent.

Beebe² has been able to produce a strong cytolytic serum and Rogers³ makes a preliminary report from the use of this serum in 10 cases of Graves' disease. There were 3 apparently perfect cures, 3 rescued from a critical condition and at that time approaching cure, and the others were more or less improved. In a later paper Rogers⁴ reports the results in 90 cases: 23 were cured of all symptoms, 53 were more or less improved, 11 were at that time unimproved, and 4 died.

Waterman⁵ reports 5 cases treated with a serum obtained from a goat two weeks after the removal of its thyroid. There were 2 cures, 2 improvements, and 1 showed no change. Somerville⁶ and Ries⁷ each report a cure from the use of thyroidectin, but in the former case a host of other measures were employed. Moyer⁸ refers to this remedy as having passed the experimental stage and possessing great palliative value.

Elsner and Wiseman⁹ are sure that antithyroidin is of great value in the treatment of Graves' disease. Heinze¹⁰ does not agree with these authors and finds the remedy of very doubtful worth.

Burkard¹¹ refers to Legge's having successfully treated several cases of Graves' disease with diphtheria antitoxin and reports a case of his own in which five weeks after the injection of 3000 units the symptoms, both subjective and objective, had almost entirely disappeared. Of 4 other cases treated in this manner, 3 showed good results, while 1 remained unchanged.

As to the treatment of Graves' disease with the x-ray, Sklodow¹² reports a case which showed striking improvement after less than a month's treatment with the rays. The case of Pfahler and Thrush¹³ showed improvement after a month, and at the end of two months, during

¹ Loc. cit.

² Loc. cit.

³ Loc. cit.

⁴ Journal of the American Medical Association, September 1, 1906.

⁵ Boston Medical and Surgical Journal, August 16, 1906.

⁶ Glasgow Medical Journal, February, 1906.

⁷ Illinois Medical Journal, March, 1906.

⁸ Journal of Nervous and Mental Diseases, xxxii, 1905.

⁹ New York State Journal of Medicine, June, 1906.

¹⁰ Deutsche medizinische Wochenschrift, xxxii, 775.

¹¹ Journal of the American Medical Association, November 3, 1906.

¹² Deutsche medizinische Wochenschrift, xxxii, Nr. 33.

¹³ Therapeutic Gazette, March 15, 1906.

which period she had received twenty-two treatments, she appeared to be well. Stegman¹ cites 3 complete cures through the use of the Röntgen rays. He considers the great value of this mode of treatment beyond question and suggests that the rays may act by producing a lesion of the gland epithelium which would give rise to a quantitative and qualitative change in its secretions. Hirschl² found that treatment with the x -rays increased the body weight, lessened the tachycardia, improved the mental condition, and did away with the alimentary glycosuria. The size of the thyroid, the exophthalmos, the tremors, and the sweating were not influenced. The particulars of 51 cases are given by Pfeiffer,³ along with the histological findings in 8 cases and the results of experimental research. He concludes that Röntgen treatment of goitre is ineffectual as a rule and should not supplant the better-trying methods.

The statistics coming from the surgical clinics certainly speak loudly for surgical interference in exophthalmic goitre as compared with the older and tried medicinal and newer serum measures, but the recent work of Beebe and Rogers may deprive the surgeon of future opportunity.

Friedham⁴ says that statistics from four large clinics show that of 109 cases 75 were permanently cured, 23 much improved, and 8 died. The mortality with internal treatment, he says, is 12 per cent. and permanent cure seems to be out of the question. He reports 20 cases of his own with 14 complete cures, 5 improvements, and 1 death, which he thinks was due to leaving too little thyroid tissue because the early tetany occurring after operation was relieved by thyroid tablets. From Riedel's clinic Schultze⁵ reports 50 cases, of which 36 were cured, 6 improved, 1 showed no improvement, and 7 died (all of heart failure within twenty-four hours). In Kocher's⁶ report of his last 1000 cases of goitre he lays particular stress upon considering the conditions of the *heart*. Even mere lowering of the blood pressure from 150 mm. to 130 mm. renders operation hazardous. He advises the internist not to persist in treatment until the condition of "goitre heart" is produced, and warns surgeons not to operate where cardiac insufficiency is present. Curtis⁷ reports 14 cases with 8 cures, 2 improvements, and 4 deaths. The deaths were all from acute thyroidism. Shepherd's⁸ series contained 17 cases: 9 were completely cured, 3 much improved, 1 relapsed, 1 was lost sight of, and 3 died. All of the deaths were desperate cases.

¹ Wiener klinische Wochenschrift, xix, Nr. 62.

² Ibid., p. 300.

³ Beiträge z. klinische Chirurgie, von Bruns, Tübingen, xlviii, Nr. 2.

⁴ Archiv f. klinische Chirurgie, vii, Nr. 4.

⁵ Mitteilungen a. d. Grenzgebieten d. Med. u. Chir., xvi, Nr. 2.

⁶ Archiv f. klinische Chirurgie, lxxix, Nr. 3.

⁷ Annals of Surgery, Philadelphia, March, 1906.

⁸ Journal of the American Medical Association, September 1, 1906.

Park¹ believes the early treatment of Graves' disease should be medical, but that after a fair trial of these methods with no encouraging results the case should be referred to the surgeon. Harden² and Schultze³ both concur in this opinion. Surgeons generally agree that the early cases are the ones most likely to benefit by operation and that the severe cases show a high mortality.

HODGKIN'S DISEASE.

It has been clearly demonstrated that this condition is to be distinguished from the disease so closely resembling it, and which in the past has been so frequently confused with it, namely, *tuberculous adenitis*. The two conditions resemble each other so closely, especially in the early stages, that it is not to be wondered at that they are frequently mistaken one for the other. Both Reed and Longcope have shown that the pathological changes in the glands in these cases are quite characteristic; and even when the two conditions occur in the same glands the two processes can be clearly distinguished. The only means at our disposal, at present, to differentiate the two conditions during life is a microscopic study of an affected gland removed from the patient. Ruffin⁴ lays stress upon the importance and value of this method of diagnosis, although he states that the absence of a tuberculin reaction may exclude tuberculous adenitis. But since patients suffering with Hodgkin's disease not infrequently show also some focus of tuberculosis, one cannot accept a positive tuberculin reaction as excluding the possibility of Hodgkin's disease in these cases.

The *etiology* of this disease remains as obscure as ever. Nothing of interest along this line has been contributed during the past year. In regard to the nature of the process involved in the glandular changes there are two entirely different views held at the present time. One group of observers contend that the process is essentially of an infectious nature, basing their views upon the following facts: (1) The clinical course; it may be acute or chronic, accompanied by fever occasionally of a characteristic type; it is prone to sudden exacerbations, and it has the final stage of cachexia with hemorrhages, diarrhea, etc. (2) The beneficial effects of arsenic. (3) The frequency with which the condition arises in the cervical glands, suggesting an infection from the throat. (4) The lymphoid tissue only is affected. (5) The mode of spreading from the affected gland to those nearest to it, metastases occurring not by cellular transplantation, but by the development of a similar process in the lym-

¹ Medical Review of Reviews, New York, July and August, 1906.

² Journal of the American Medical Association, February 17, 1906.

³ Loc. cit.

⁴ American Journal of Medical Sciences, April, 1906.

phoid tissue situated elsewhere in the body. (6) The failure of the process to infiltrate the capsule of the gland and the surrounding tissue. (7) The histological picture.

Gibbons¹ believes the weight of evidence points rather toward a malignant growth than toward one of infectious origin, on the following grounds: That the clinical course and the beneficial effects of arsenic apply equally well to a malignant growth (sarcomatous) and an infectious granuloma. In his series of 9 cases, which he reports in detail, infiltration of the capsule of the lymph gland occurred in every case; in 5 the tumor showed undoubted extension through the capsule, and 2 of the cases showed involvement of the muscle, salivary gland, and fascia. This he believes to be clear evidence of malignancy. He thinks that it has not been clearly shown that the metastases only occur by a growth in the preëxisting lymphoid tissue in other organs, 1 of his cases showing direct involvement from the tumor through the pleura and into the lung, without any regard to the situation of the lymphoid tissue; three of his cases showed the growth in the liver, invading the walls of a vein and passing through it. The jugular vein was also invaded in 1 case. Other observers have noted this same process in the liver and spleen. He believes the histological picture resembles a sarcomatous process as much as it does an infectious granuloma. The value of his views are strengthened by the fact that his cases showed the identical histological picture that has been described by Reed and Longcope.

It is of interest in this regard to note that all attempts to inoculate animals with portions of the glands have been absolutely negative. Writers, with very few exceptions, agree upon the fact that the question as to the nature of the process is by no means settled.

As the eosinophile cells in the lymphomatous nodules in this condition are rather striking, the following case reported by Longcope² is of distinct interest. He publishes the results of a study of the distribution of the eosinophilic leukocytes in a fatal case of Hodgkin's disease, which presented during life a general *eosinophilia*. On two examinations of the blood the eosinophiles were 13 and 9 per cent. of the total leukocyte count. This case is of interest for two reasons: first, on account of the presence of an eosinophilia in an uncomplicated case of Hodgkin's disease; secondly, because the patient died a mechanical death, and therefore offered an excellent opportunity for a study of the hematopoietic organs under such conditions. The youth, nineteen years of age, was admitted to the hospital May 19, 1905, complaining of swellings in the neck, which he first noticed two months before admission, and which formed two large, irregular, hard masses above the clavicles, neither painful nor tender. There was a considerable cough

¹ American Journal of the Medical Sciences, November, 1906.

² Bulletin of the Ayer Laboratory, June, 1906.

and dyspnea, increasing in severity. Breathing became very difficult, though the patient felt well otherwise and was walking about. A few days later he literally strangled to death. On admission to the hospital a small tumor was removed from the cervical masses for diagnosis. The tumor appeared to be a small lymph node, showing changes characteristic of Hodgkin's disease. Among the cells in this gland were enormous numbers of eosinophilic leukocytes, in places predominating over all other types. Their distribution was not altogether regular, for in some places they were much more numerous than in others. Toward the centre of the glands the cells stained rather poorly. About the periphery of the glands the cells stained much better. In the connective-tissue capsule, eosinophiles were almost as numerous, in places, as in the central portions. Careful search showed no karyokinetic figures in the eosinophiles. The autopsy showed, in addition to Hodgkin's disease, a small, caseous, tuberculous nodule in the lung. All organs showed intense congestion. No parasites were found in the alimentary tract. Longcope directed his attention chiefly to the presence and distribution of the eosinophile cells in studying the organs histologically. In the cervical tumors eosinophiles were encountered in enormous numbers and had much the same appearance and distribution as was noted in the small node removed at operation, except that the connective tissue and bloodvessels of the capsule showed no eosinophiles. In the lung he found a few polynuclear eosinophiles scattered about the bronchi, but in no greater numbers than are often found normally. In the spleen the eosinophiles were scattered among the pulp cells and in the venous sinuses, in comparatively small numbers. The mesenteric lymph nodes showed a fair number of eosinophile cells, and the thymus a few large mononuclear eosinophiles. In the tumor nodules which involved this organ eosinophiles were as numerous as in the lymph-node tumors themselves. The study of the bone-marrow taken from the right femur and the ribs revealed a particularly interesting condition. In smears made from the fresh material and stained in Jenner's mixture the most notable feature was the great number of polymorphonuclear neutrophilic leukocytes and the number of eosinophilic myelocytes. A differential count of the bone-marrow cells made from smears stained with Jenner's mixture showed the following percentages in 1000 white cells: neutrophilic granular myelocytes, 169 (16.9 per cent.); transitional neutrophilic granular myelocytes, 32 (3.2 per cent.); eosinophilic granular myelocytes, 120 (12 per cent.); polymorphonuclear neutrophilic leukocytes, 513 (51.3 per cent.); polymorphonuclear eosinophilic leukocytes, 24 (2.4 per cent.); small mononuclear lymphocytes, 78 (7.8 per cent.); large mononuclear lymphocytes, 20 (2 per cent.); unidentified cells, 44 (4.4 per cent.). During this count 86 normoblasts and 6 megaloblasts were seen. A count was made from paraffin sections of the marrow from the femur, stained in polychrome methylene blue and eosin, and

it gave much the same as the count just given. The most striking feature was the large number of polymorphonuclear leukocytes, and the great relative increase in the eosinophilic myelocytes over the neutrophilic myelocytes.

The striking features of Longcope's case are: (1) the increase in the eosinophilic leukocytes of the circulating blood during life, (2) the enormous number of eosinophilic leukocytes found in the tumors from the neck, and in the bloodvessels immediately about the tumors, combined with (3) a specific increase in the eosinophilic myelocytes of the bone-marrow. As far as he could learn under normal conditions they form but a small percentage of the cells, 4 per cent.; whereas in this case they made up 12 per cent., while the proportion of the other cells was not greatly altered. In this case of Hodgkin's disease he could only suppose that the eosinophilic leukocytes accumulated in the tumor nodules by one of two methods: either they were formed locally in the lymphomatous tumors, or they were brought to this situation by the blood stream. He found no evidence of a local formation of eosinophiles. No transition forms were found, no evidence of proliferation of the eosinophiles, and no mitotic figures. On the other hand, the cells toward the centre of the tumor appeared much older than those about the periphery, and in and about the vessels of the capsule and the surrounding tissue there were great numbers of eosinophile cells. He believes it therefore probable "that in this instance the eosinophilic leukocytes were not produced in the tumor nodules, but were brought there from the blood, and that they were formed from the eosinophilic myelocytes in the bone-marrow, which were present in abnormally large numbers. The increased demand for eosinophiles gave rise to an increased production with hyperplasia of the eosinophilic myelocytes of the bone-marrow, from which the polynuclear variety are formed, and a resulting general eosinophilia.

Clinically the cases often show a distinctly relapsing type of temperature. This was very noticeable in Ruffin's¹ case, in which there were periods of pyrexia ranging from ten to thirty-five days in duration, interrupted by periods of apyrexia usually of shorter duration. One of Gibbons' cases also showed this condition.

The *blood picture* is by no means characteristic, usually merely showing a secondary anemia.

The *treatment* is usually absolutely ineffectual, the cases tending more or less rapidly and regularly toward a constantly fatal termination. The duration of the disease is about three months to three years, although cases occasionally live longer. Arsenic not infrequently gives temporary improvement in these cases. The *x-rays* also appear to give some relief. Atkinson² reports the case of a young woman who improved so much after one year's treatment by this procedure that she was able to

¹ Loc. cit.

² Virginia Medical Semi-monthly, July 12, 1906.

return to her work after being in a desperate condition. A subsequent collapse did not show the same beneficial effects from the use of the *x*-rays.

ADDISON'S DISEASE.

During the past year 6 cases of Addison's disease have been reported, in some of which peculiar symptoms or atypical phases of the disease were noted. McCartney¹ reports a case in a man of thirty-nine. This patient had felt bad for a year and had been obliged to discontinue his work. He complained of nausea, vomiting, pain in the stomach, weakness, and loss of appetite. He was very irritable and morose. He came under treatment for an abscess of the cheek, which came apparently from a scratch on the nose. He was running a septic temperature and had daily chills. After incision and drainage of the abscess he was better for a short time, and temperature and pulse became normal; but after a few days his temperature rose and for some six weeks ranged from 97° to 103°, and his pulse from 100 to 150. He was very weak and staggered when he walked and almost fell at times. He had severe pain in the left kidney and shoulder, and bronzed spots developed on the back, chest, abdomen, and about the corners of the mouth, and also on the mucous membrane of the mouth. A diagnosis of Addison's disease was made, and two other physicians concurred in this. He was placed on a suprarenal extract and the drug was pushed. At first he exhibited an intolerance, but later was able to take large doses of the drug with the result that after six months he was symptomatically well and had gained thirty pounds. The bronzing had disappeared and he was apparently a well man.

Tibbles² reports 2 cases. He says that the functions of the suprarenal bodies are: (a) the elaboration of a secretion which is essential to the blood, (b) the destruction of effete products of metabolism, especially hemoglobin, and (c) the nervous function which is closely associated with that of the great sympathetic ganglia of the abdomen. While pigmentation of the skin and mucous membranes is probably the most striking feature of Addison's disease, it is only a superficial manifestation of a deep-seated malady. The author enumerates the symptoms and in regard to them says: "These symptoms are probably in part due to auto-intoxication (probably by leukomains), as the adrenals are depurative organs; and in part to the destruction of the nervous tissue which goes to make up the adrenal, with the consequential disturbance of the abdominal sympathetics."

Of his 2 cases, 1, a man of forty-eight, presented the typical symptoms of Addison's disease, with excessive pigmentation. This man

¹ Denver Medical Times, November, 1905.

² British Medical Journal, December 30, 1905.

gradually failed and died from exhaustion eighteen months after the inception of the disease.

The second case, a woman of thirty, presented the characteristic symptoms and in addition a peculiar pigmentation. The hands and forearms were of a peculiarly greenish color, as if they had been dyed; and on the dorsal surface of each hand and on the right forearm there were patches several inches in diameter, of a white and shining appearance, smooth and colorless, but soft, pliant, level with the surface, and having normal sensation. These patches were diagnosticated as leukoderma occurring in the course of Addison's disease. The disease began insidiously two years before coming under treatment. This patient when placed on a course of treatment, tonic and stimulant in character, did very well and at the end of six months felt better than for years. Tibbles does not claim a cure in this case and expects a relapse. He thinks, however, that Addison's disease can be cured and that calcification or fibrosis can occur in a tuberculous suprarenal just as easily as in a tuberculous lung. In that event the healthy organ may supply the secretion necessary, or if both are diseased the economy may grow accustomed to the loss of secretion.

Lecky¹ reports a case which had an acute toxic course. This man, a laborer, suddenly became ill and was very chilly, but had no distinct rigors. He became distinctly pigmented at this time, so much so that friends told him he was jaundiced. No other symptoms were spoken of as occurring at this time. In two weeks he went to visit some friends and in another week went to work. After working several days, he was seized with intense pain in the joints and had a high temperature. He was admitted to the hospital as a case of acute articular rheumatism and was treated with salicylates, after which treatment his temperature came down to normal and his pain ceased. In a few days his temperature rose again, and blood was passed by bowel and in the urine. Leucine was also found in the urine. A stuporous condition supervened and the man died just thirty-nine days from the inception of the disease. At autopsy the adrenals were both found to be in a fibrocaseous condition, and the right kidney was converted into a series of cysts filled with a putty-like substance. Two small, caseous foci were found in the globus major of the right testis.

Bönnmann² tells of a case which he had the opportunity to observe for four years, and also of the postmortem findings. There was not a trace of anything to suggest either tuberculosis or syphilis. The patient, a man, had fallen on the edge of an open trunk, hitting the region of the right suprarenal. He never quite recovered from the accident, and in the course of a year developed symptoms of Addison's disease, to which

¹ Lancet, February 17, 1906.

² Deutsches Archiv f. klinische Medizin, lxxxvi, Nr. 6.

he succumbed three years later. Both suprarenals were found transformed into large, hard tumors, with necrosis in the centre, and no trace of suprarenal substance could be discovered. The solar plexus was mostly included in the tough, fibrous mass forming the tumors. It is the first case on record, he says, of true Addison's disease of unmistakable traumatic origin.

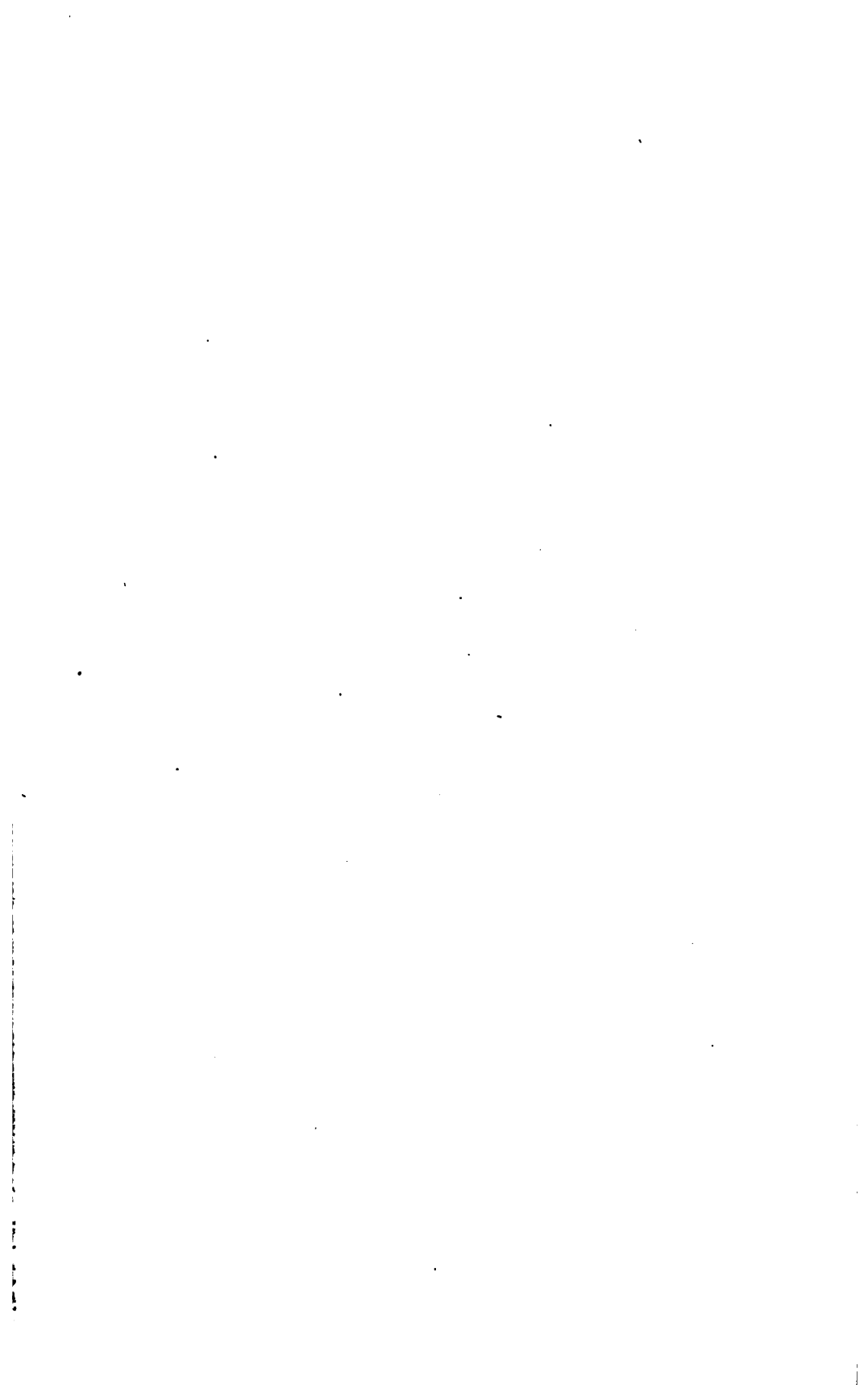
Short¹ reports a case in which he had an opportunity to estimate the blood pressure, and in which he used this estimation as a guide for his therapeutic measures. He found the blood pressure very low in his case, 80 mm. of mercury; but he was able to elevate it to 120 mm. of mercury by the use of digitalin and suprarenal extract. He arrives at the following conclusions:

1. The symptoms of Addison's disease are due to vasomotor paralysis. This is due to the absence from the blood of adrenalin, the normal excitant of the sympathetic nerve endings.

2. The pigmentation is due to vascular relaxation of the skin, causing exaggerated functional activity of the pigment cells.

3. The most promising line of treatment on theoretical grounds is the administration of vasoconstrictors of prolonged action. Digitalin has given good results in one case.

¹ *Lancet*, August 4, 1906.



OPHTHALMOLOGY.

By EDWARD JACKSON, M.D.

Diseases of the Conjunctiva. BACTERIAL INFECTIONS. Papers similar to that of McKee¹ and the symposium² by Derby, Shumway, Weeks, Pusey, and Thomson deal with the general aspects of this subject, and leave it necessary only to mention the latest important additions to our knowledge of it. Duane and Hastings³ find there is no special type of conjunctivitis associated with a special germ, and Pusey has the same thought when he urges the necessity for the bacteriological examination in all cases of conjunctivitis. Usher and Fraser,⁴ however, were able to make a correct clinical diagnosis of acute contagious conjunctivitis due to the Koch-Weeks bacillus in about 87 per cent. of their 300 cases; and of 250 cases of diplobacillus conjunctivitis about 70 per cent. were correctly diagnosticated. Typical cases of any form can be recognized at any time with strong probability, and during an epidemic with practical certainty, by their clinical characteristics, when one has learned by routine bacteriological examination to connect these characteristics with the causative organism. But, as with other diseases, many cases are not typical.

In America the *diplobacillus of Morax and Axenfeld* is the most important single bacterial cause of conjunctivitis. It has been frequently recognized in the cities of the Atlantic coast, also in Montreal, Chicago, Denver, Omaha, and intermediate cities; while in the Western Mississippi Valley conjunctivitis due to the Koch-Weeks bacillus is at least extremely rare. Silva⁵ finds the action of zinc sulphate solutions in curing the diplobacillus conjunctivitis to be chiefly by inhibition of the growth of the organism, a 2 or 3 per cent. solution being required to actually destroy it.

The *Streptococcus mucosus* was found by Wirtz⁶ to be the cause of a conjunctivitis with a peculiar stringy, fibrous secretion, which formed a grayish-white mass covering the cornea. Four months later it had invaded the cornea, causing a deep ulcer and hypopyon. Thorough

¹ American Journal of the Medical Sciences, June, 1906.

² Transactions of the American Medical Association, 1906. Section on Ophthalmology.

³ New York Medical Journal, May 26, 1906.

⁴ Royal London Ophthalmic Hospital Reports, vol. xvi, pt. iv.

⁵ Klinische Monatsblätter f. Augenheilkunde, Supplement.

⁶ Ibid., October.

washing of the conjunctiva four to six times daily with a 3 per cent. solution of potassium chlorate rapidly checked the conjunctivitis and brought about healing of the ulcer. The same organism was found in a case of metastatic panophthalmitis supervening on a general infection reported by Pagenstecher.¹

The bacterial flora of the conjunctival sac has been studied by Randolph² in 100 cases of typhoid fever and 48 cases of pneumonia. As in the healthy conjunctival sac, the predominant organism was the *Micrococcus albus*. In 59 cases of typhoid it was the only organism; and in 23 cases it was found associated with other bacteria. In 8 cases the *Micrococcus aureus* was found alone, and in 13 cases with other bacteria. Among the cases of pneumonia the *Micrococcus albus* occurred 24 times alone, and in 14 with other bacteria. The pneumococcus was found twice alone and once with the *Micrococcus albus*; *Micrococcus aureus* once alone, and 9 times with the albus. The discovery of this one organism so frequently in the conjunctiva in disease, as it is also found in health, leads Randolph to think that it has a protective function, defending the conjunctiva against the growth and multiplication of bacteria which are more decidedly pathogenic for the eye. He suggests "that exposed mucous surfaces throughout the body are inhabited by bacteria which perform for their resting place functions of a protective character by making the surroundings uncongenial for bacteria of other kinds."

BACTERICIDAL POWER OF COLLYRIA. *Sodium aurate* is suggested by Verhoeff³ as an efficient bactericide for use in the conjunctiva. It is prepared by neutralizing so-called "gold chloride" in 2 per cent. solution by sodium hydrate, and securing a permanent, faintly acid, non-irritant solution with boric acid. The one-half per cent. solution is a more powerful antiseptic for the conjunctival bacteria than the 1 to 1000 sublimate solution. It can be freely used in the conjunctiva without causing serious irritation or danger of poisoning, and it does not stain the conjunctiva, although it may stain the skin.

Potassium chlorate in 3 per cent. solution is found by Koster⁴ to exert an important inhibitory influence upon the growth of bacteria commonly found in the conjunctiva. He ranks it with the 1 to 5000 solution of sublimate for antiseptic power; and it is as non-irritant as the ordinary solutions of boric acid.

The organic silver salts have been claimed to possess the same bactericidal power as silver nitrate, or even a greater efficiency, because of the larger proportion of silver they contain, and their power of "penetrating" the tissues, as shown by deep staining. Two careful experimental studies of their action have been reported within the last year, one by

¹ Klinische Monatsblätter f. Augenheilkunde, Supplement, November, December.

² Transactions of the American Ophthalmological Society, 1906.

³ Journal of the American Medical Association, January 27, 1906.

⁴ Zeitschrift f. Augenheilkunde, vol. xv, p. 524.

Derby,¹ the other by Marshall and Neave.² Their results agree in indicating that while *silver nitrate* has a high antiseptic value, the best of the organic salts of silver, *protargol*, is decidedly inferior to the nitrate; and the non-irritant preparations, *argyrol* and *collargol*, have little or no power of inhibiting the growth of germs exposed to them, even when in strong solution.

PURULENT CONJUNCTIVITIS. A case of *ophthalmia neonatorum* due to the *Bacillus coli communis* is reported by McKee.³ The symptoms were those of purulent ophthalmia; but, like previously reported cases, it ran a comparatively mild course. Of antepartum ophthalmia 17 cases are reported by Stephenson and Ford,⁴ who think such cases not very uncommon. About one-half of them are accounted for by premature rupture of the membranes. In other cases these writers assume some slight injury of the membranes or infection through the uninjured membranes. Stephenson⁵ reports a case of severe ophthalmia neonatorum with the destruction of both corneas, followed by general septic infection and multiple abscesses, but ending in recovery. The gonococcus was not found in the conjunctival discharge, nor in the pus from the abscesses.

Despite the grave doubt raised as to the bactericidal power of the newer silver salts by the investigations above referred to, they still find enthusiastic advocates of their value in the treatment of purulent conjunctivitis. Standish, Bruns⁶ and Hinshelwood⁷ urge the use of strong solutions of argyrol, instilled at short intervals. Bruns calls it the immersion treatment. Standish has used this plan, suggested by Dr. Hussey. A dam of putty was built around the eye. This was filled with the argyrol solution, and the eye kept submerged in it for from ten to twenty-five minutes. Nevertheless, in the discussion of two of these papers before the American Ophthalmological Society, most of the speakers expressed emphatically the conviction that the organic silver salts could not be depended upon as could the nitrate.

Cutler⁸ has treated 2 cases of *ophthalmia neonatorum* with Torrey's *antigonococcus serum*. Both recovered, but as the ordinary treatment was not omitted no estimate of the value of the serum can be formed from this experience.

PETRIFYING CONJUNCTIVITIS was described in **PROGRESSIVE MEDICINE**, June, 1901. Leber⁹ showed a case at the Heidelberg Congress, and

¹ Transactions of the American Ophthalmological Society, 1906.

² British Medical Journal, August 18, 1906.

³ Montreal Medical Journal, October, 1906.

⁴ Ophthalmoscope, April, 1906.

⁵ Ophthalmic Record, September, 1906.

⁶ Transactions of the American Ophthalmological Society, 1906.

⁷ British Medical Journal, May 12, 1906.

⁸ Archives of Ophthalmology, July, 1906, p. 409.

⁹ Transactions of the Thirty-third Heidelberg Ophthalmological Congress.

called attention to the intensely acid reaction of the broken-down tissues in the affected spots, which reaction he had demonstrated depended upon the presence of sulphuric acid.

TRACHOMA. Todd¹ reports the case of a young woman suffering from trachoma several years, who was attacked with typhoid fever, during the course of which disease her eyes steadily improved. Pannus cleared up within two weeks, and the trachoma follicles disappeared from the lids. She remained under observation six months afterward without any sign of recurrence.

The treatment of trachoma with the *x*-rays was referred to two years ago.² Further experience with this method has not led to its extensive adoption, although some good results are reported. Newcomet³ states that to prove effective in trachoma the action of the *x*-rays must be pushed to the extent of a mild burn; whereas in epithelioma any such visible effects should be avoided. Among the experimenters with new methods the *x*-rays have been replaced by *radium*, regarding which the reports show a similar uncertainty and disagreement. Dinger⁴ reports 7 cases entirely cured of 16 subjected to the treatment. Thielemann⁵ proved by excision and microscopic examination of the trachoma granules that they underwent a process of involution under the influence of radium. Jacoby⁶ finds that radium has a distinct therapeutic influence on trachoma, but not so powerful as methods of treatment previously in ordinary use. Wicherkiewicz⁷ reports that the radium treatment was without results, although the specimen used was from the same source as Cohn's, who found it of value. Darier⁸ thinks that the thickness of the tube may prevent the radium from proving effective. Schiele⁹ advises beginning with very mild applications and gradually increasing their strength to avoid unfavorable results. But neither he nor anyone else who has used radium clinically reports any unfavorable effect from it; although Birch-Hirschfeld¹⁰ demonstrated such effects experimentally from prolonged and frequent exposures of the eyes of lower animals.

EUPHTHALMIN CONJUNCTIVITIS. The use of euphthalmin in ophthalmic practice, chiefly to produce brief dilatation of the pupil, is rarely continued long enough to test the liability of the drug to cause conjunctivitis. It is well known that atropine instilled daily for long periods causes, in susceptible persons, what has been called atropine conjunc-

¹ Ophthalmic Record, January, 1906.

² PROGRESSIVE MEDICINE, June, 1904.

³ Annals of Ophthalmology, October, 1906.

⁴ Berliner klinische Wochenschrift, 1906, xliii, Nr. 40.

⁵ Zeitschrift f. Augenheilkunde, December, 1905.

⁶ Deutsche med. Wochenschrift, 1906, xxxii, Nr. 2.

⁷ Postep Okulistyczny, June, 1906.

⁸ La clinique ophtalmologique, January 10, 1906.

⁹ Heilkunde, October, 1906.

¹⁰ Klinische Monatsblätter f. Augenheilkunde, December, 1905.

tivitis. Kipp¹ reports a case in which euphthalmin in 4 per cent. solution was instilled twice daily to dilate the pupil, to improve the vision impaired by partial cataract. It was used thus four weeks before any unfavorable symptoms appeared. Then there came swelling of the lids and abundant mucopurulent secretion from the conjunctival sac, and the eyes were somewhat painful. The drug was stopped and the symptoms improved. Then a 2 per cent. solution was tried, and swelling and secretion recurred and became worse than before. Careful investigation showed no fault in the particular preparation of the drug used.

ANILINE CONJUNCTIVITIS. From time to time cases of severe inflammation have been reported as arising from contact of aniline dyes with the conjunctiva, or from the embedding of particles broken off from aniline pencils. Voght² has made a clinical and experimental study of such injuries. He finds that the insoluble preparations of aniline, and also the acid and neutral or mordant preparations, produce little or no inflammation; but the basic aniline colors produce severe inflammation of the conjunctiva and may set up a panophthalmitis.

The action of these basic preparations can be largely neutralized by irrigation of the conjunctival sac with a 5 per cent. solution of tannin. Irrigations with water or solutions of common salt, boric acid, or sodium bicarbonate are of no benefit. So frequent and serious are the injuries produced by aniline colors, among the workers in them, that Voght would have their use for making inks and crayons, etc., restricted as much as possible.

TUBERCULOSIS OF THE CONJUNCTIVA. Villard³ states that not more than 150 cases of this condition have thus far been published; but the literature of the past year includes the reports of 18 cases. Gourfein⁴ at Geneva encountered 3 cases in about 49,000 eye patients. Lundsgaard⁵ reports 11 cases occurring among 1250 patients sent to the Finsen Light Institute, in Copenhagen, to be treated for lupus. The difficulties of diagnosis are well known. Tubercle bacilli are but few, and in some, as in one of Auerbach's cases,⁶ inoculation of the guinea-pig demonstrated the tuberculous character of the lesion when no bacilli could be discovered. It is probable that only cases positively demonstrated to be tuberculous are usually published as such, while a larger number of cases recognizable as probably of this character are encountered.

The plan of treatment chosen will depend upon the presence of tuberculosis elsewhere in the body. Villard claims that in at least 60 per cent. the tuberculosis is primary in the conjunctiva, that in a few

¹ Ophthalmology, January, 1906.

² Archives d'ophtalmologie, April, 1906.

³ American Journal of Ophthalmology, July, 1906.

⁴ Archives d'ophtalmologie, September, 1906.

⁵ Klinische Monatsblätter f. Augenheilkunde, March, April, 1900.

⁶ Wiestnik Oftalmolog., May, June, 1906.

the conjunctival lesion is secondary to infection of the nasopharynx, and that in not over 25 per cent. is it endogenous. It is certain, however, that when recognized the process has usually involved the neighboring lymphatic glands.

Fergus¹ excised the diseased tissue and at the same time the affected glands, one of which was found in an advanced state of caseation. Cabannes² treated his case by repeated cauterization—six rather extensive applications. Both these were cured. Lundsgaard from his large experience advises excision of all diseased tissue, if this is practicable. If the lesion be too extensive for complete excision his next choice is phototherapy. If this cannot be resorted to, the tuberculin treatment is justified. After these he ranks the cautery and curetting. The cautery has the important advantage of not opening up new channels for infection. It should not be forgotten, however, that cases go on to complete recovery under the climatic and general treatment of tuberculosis.

Diseases of the Cornea. DEFECTS OF DESCMET'S MEMBRANE. Linear defects in the membrane of Descemet in distended eyeballs, as in high myopia, conical cornea, buphthalmos, and intra-ocular tumor, have been reported from time to time; and Seefelder³ demonstrated that the appearances in question are actually due to breaks in the posterior limiting membrane of the cornea. Several of these cases have been reported within the last year. Fleischer⁴ found such markings in both corneas of a boy of ten, who had myopia of 20 to 25 D., and a young woman of twenty-one, with myopia of 15 and 9 D. The former, after extraction of the crystalline lens, obtained vision of $\frac{5}{20}$ and $\frac{5}{30}$. The latter with correcting lenses had $\frac{5}{20}$ in each eye.

Stephenson⁵ reports a case, in a girl aged twenty-one, in which the right eye, suffering from very high compound myopic astigmatism, presented numerous clefts in Descemet's membrane. The left eye with moderate hyperopic astigmatism showed no such corneal changes. He also reports a case of buphthalmos, with vision sufficient for the child to get around, in which such markings were found in both eyes. C. A. Wood⁶ also reports a case occurring with myopia of 20 D. in one eye, while the other eye, with moderate hyperopic astigmatism, had a normal cornea.

The markings produced by such fissures in Descemet's membrane are seen with a good magnifier or a corneal microscope. They are double-contoured. Stephenson compares them to cracks in ice or flaws in glass. Wood says they resemble the superficial markings of "crackled glass." They are more or less parallel to each other, approaching in form arcs of circles, which may be variously distributed.

¹ Ophthalmic Review, February, 1906.

² Archives d'ophtalmologie, January, 1906.

³ Klinische Monatsblätter f. Augenheilkunde, October, 1905.

⁴ Ibid., January, 1906.

⁵ Ophthalmoscope, June, 1906.

⁶ Ophthalmic Record, December, 1906.

In different eyes they have varied from a half-dozen to fifteen or twenty. They are evidently situated deep in the cornea.

A congenital defect of a different kind is described by Peters.¹ Each cornea presented a central, disk-like opacity, most dense toward its periphery. The child dying of tetany when nine months old, section of the eye showed complete absence of the membrane of Descemet over the affected portion of the cornea, which was thinned and surrounded by an anterior synechia. The absence of any evidence of inflammation led Peters to believe that the defect was one of development, arising, perhaps, from too prolonged contact of the anterior surface of the lens with the cornea.

EFFECTS OF FORMALDEHYDE ON THE CORNEA. A case in which a drop of the 40 per cent. solution of formaldehyde was applied to the cornea is reported by Sager.² The irritant was washed out as quickly as possible. For a time there was no special inconvenience, but within six hours the eye became very painful, the pain increasing and lasting for several hours. When seen five days later there were swelling of the lids, photophobia, profuse lacrymation, chemosis, and a large ecchymosis above the cornea. The cornea was steamy, or opalescent, in appearance. Six months later the cornea still appeared steamy to the naked eye, a shaded, superficial opalescence covering the lower two-thirds of the pupillary area. The best vision obtainable was $\frac{8}{12}$, varying with the position of the head and light. Other parts of the eye were not affected. (See Toxic Amblyopias.)

SNOW BLINDNESS. In 6 cases of recent snow blindness Strader³ found the whole area of the cornea corresponding to the narrowed palpebral aperture (about 1 mm. wide and 5 or 6 mm. long) stained readily with fluoresceine. To ordinary inspection it showed only a slight lessening of the corneal lustre. Under treatment for traumatic corneal erosion, irrigation with saturated solution of boric acid, atropine, heat, and a bandage, recovery was practically complete in twenty-four hours. Strader points out that this condition of the cornea in snow blindness was reported some twenty years ago by Graddy; but that, while many descriptions mention corneal lesions in connection with snow blindness, no one else seems to have noticed their constant presence, or to have regarded the corneal condition as the cause of the photophobia, blepharospasm, and ciliary neuralgia which attend this condition.

ANTIPIRYNE KERATITIS. To the amblyopia, mydriasis, and inflammatory changes in the conjunctiva and lids that have been observed from the use of antipyrine, Inouye⁴ would add a special form of keratitis. A woman, aged forty-eight, who had used antipyrine on the skin, on account of irritation with great itching from exposure to sunlight, took two doses,

¹ *Klinische Monatsblätter f. Augenheilkunde*, January, February, and March, 1906.

² *Ophthalmoscope*, February, 1906.

³ *Ophthalmic Record*, November, 1906.

⁴ *Ophthalmology*, July, 1906.

aggregating 1.8 grams (gr. 27) internally. Five hours after the last dose the eyes became painful and swollen, with swelling of the lips, mouth, and tongue. Next morning the pain diminished, and by evening there remained only four red spots on the back of the hands. But the whole face was red and swollen, the swelling being greatest in the upper lids. Many small infiltrations were observed in the corneas. Some portions of the surface, however, were quite free from them. The reflex from the corneal surface was irregular, and the vision greatly diminished. Dionin in 2 per cent. solution quickly relieved the pain. The corneal infiltration gradually disappeared, vision improved, and after four days the cornea appeared normal.

Inouye has been able to find in the Japanese literature the report of 1 similar case, by Mizno. This patient had also used antipyrine upon the skin and internally. Erosions appeared on the cornea, one of them 3.5 x 2 mm. in size, which three days later no longer stained with fluorescein. In this case local disorders of circulation were indicated by red plaques, followed by blisters in different parts of the skin.

BACTERIOLOGY OF SUPPURATING CORNEAL ULCER. It is well known that the *diplobacillus* of Morax and Axenfeld may cause corneal ulcer. Agricola¹ reports 22 cases in 16 of which hypopyon appeared, and in several there was extensive involvement of the corneal surface. But these ulcers do not usually extend over large areas, like the creeping or serpent ulcer.

Corneal suppuration due to infection by the *Bacillus pyocyaneus* runs a much more unfavorable course. Cases have been reported in the past year by Callan and Ewing,² and by Bietti.³ Bietti's case, after an optical iridectomy, could see hand movements at two meters. The other patients had in the end mere light perception. Ulcers of this character show a strong tendency to extend until the infiltration occupies the whole cornea.

The most effective treatment appears to be by the galvanocautery. This should be applied very thoroughly, and its use may have to be repeated. Ewing, experimenting on the bacillus obtained from his case, found cultures active and virulent at the end of eight months. He points out the bearing of this on the sterilization of instruments used in the treatment of such eyes.

The bacteriology of the usual forms of *serpent ulcer* has been studied by McNab,⁴ who in 25 cases found the pneumococcus present in 16, "the xerosis bacillus" in 9, staphylococcus albus in 3, aureus in 2, and a diplococcus of doubtful nature in 1.

SERUM TREATMENT OF CORNEAL ULCER. The importance of the pneumococcus in the causation of serpent ulcer has led to the rather

¹ Klinische Monatsblätter f. Augenheilkunde, Supplement.

² Transactions of the American Ophthalmological Society, vol. xi, 1.

³ Annali di Ottalmologia, 1906, pts. v, vi.

⁴ Ophthalmic Review, March, 1906.

extensive trial of antipneumococcus serum in its treatment.¹ The best showing of results from this treatment, thus far reported, has been by Mayweg.² He had 23 cases, in 7 of which the action of the serum was good and in 8 very good, while in 2 it brought the process to a standstill. The best results were obtained in recent cases, and with large doses of the serum—30 c.c. within twenty-four hours.

INTERSTITIAL KERATITIS. A case of dense opacity in the anterior layers of the true corneal tissue, *following mumps* which had been preceded by an attack of influenza, is reported by Charles.³ There was, also, a considerable area of the cornea stained by fluorescin. The iris was not involved. The infiltration rapidly diminished under treatment with atropine and yellow oxide of mercury ointment, so that in four weeks vision rose from $\frac{1}{4}$ to $\frac{1}{2}$; 1 other case of corneal involvement with mumps was found reported in the literature.

That mechanical injury is an exciting cause of interstitial keratitis is a view supported by a number of reported cases. Von Hippel, at the last Heidelberg Ophthalmological Congress, reviewed the cases found in the literature, and concluded that a causative connection between trauma and typical parenchymatous keratitis had not been shown. He was followed by Pfalz, who reported a case in which bilateral parenchymatous keratitis followed a superficial wound of one cornea. In the discussion of these papers Hummelsheim, Greef, Peters, Augstein, Hessburg, Limburg, and Schirmer all instanced cases which might be regarded as indicating the connection between injury and interstitial keratitis.

In the literature of the year Enslin⁴ reports a case of interstitial keratitis following a very superficial injury, in a patient who presented no evidence of scrofula or congenital syphilis. Terlinck⁵ reports a case following injury of the cornea by a scale of iron, in a scrofulous youth of seventeen, and suggests that this question has important bearings on the determination of indemnity for such injuries. Faith⁶ reports 4 cases, in 3 of which the process was confined to one eye. In 1 patient with evidence of hereditary syphilis, and already suffering from interstitial keratitis in one eye, the disease in the second eye immediately followed a traumatic ulcer of the cornea. Faith believes that trauma of some kind is one of the exciting causes of ordinary interstitial keratitis; and he suggests that the irregularity in the interval between the attacks in the two eyes may be due to the absence of an exciting cause to act on the unaffected eye.

¹ PROGRESSIVE MEDICINE, June, 1906.

² Klinische Monatsblätter f. Augenheilkunde, July, August, 1906.

³ American Journal of Ophthalmology, July, 1906.

⁴ Zeitschrift f. Augenheilkunde, March, 1906.

⁵ La clinique ophtalmologique, February 10, 1906.

⁶ American Journal of Ophthalmology, June, 1906.

Pathology. From an extended study of the pathological changes in interstitial keratitis Elschnig¹ concludes that the primary essential lesion is a proliferation of the fixed corneal cells, followed by necrotic changes; that the lesions are not secondary to disease in other parts of the eye, or dependent upon destruction of the membrane of Descemet. Reis,² in a case of congenital annular parenchymatous keratitis, also noted the proliferation of the fixed corneal cells, degenerative changes in their nuclei, and small necroses of the corneal tissue without any formation of new vessels. He was not able to demonstrate the presence of the *Spirochete pallida*, brought forward by Schaudinn as the cause of syphilis. Greef and Clausen,³ studying the effects of syphilitic inoculation of the corneas of apes and rabbits, found that in the beginning of the clouding the spirochete was present; but when the opacity became intense its presence in the cornea could no longer be demonstrated. The interstitial keratitis produced in the lower animals by the presence of different species of trypanosoma in the cornea has been studied by Morax,⁴ Römer, and Stargardt.⁵

Diseases of the Uveal Tract. **IRITIS.** The value of *paracentesis* of the anterior chamber at an early stage of iritis, and examination of the aqueous by cultures and staining methods, has been urged by zur Nedden.⁶ He was thus able by use of Giemsa's stain to demonstrate an organism apparently identical with *Spirochete pallida*, which was present in small numbers in a case of *syphilitic* iritis. In tuberculous iritis positive results are thus obtained in the early stages, but not later. The withdrawal of the aqueous by producing a free flow into the eye of blood serum charged with the necessary anti-bodies may also greatly hasten a cure.

PIGMENT TRANSFERENCE. In chronic iritis the deposits upon Descemet's membrane often contain masses of pigment cells. Gilbert⁷ reports a case in which the transference of pigment from the iris to the posterior surface of the cornea was directly demonstrated. In this case a section of the iris became quite devoid of its anterior pigment layer, changing from brown to light blue in color. Such alterations in the color of the iris have been noted by other observers after prolonged uveal inflammation.

INTRAVENOUS INJECTIONS. In the treatment of *rheumatic iritis* Sauton,⁸ in Darier's Clinic, has employed intravenous injections of sodium salicylate, and finds that by this method of administration the drug proves more prompt and lasting in its action, and less unpleasant

¹ Graefe's Arch. f. Ophthalmologie.

² Klinische Monatsblätter f. Augenheilkunde, September, 1906, p. 293.

³ Ibid., p. 295.

⁴ Annales d'oculistique, December, 1906.

⁵ Klinische Monatsblätter f. Augenheilkunde, September, 1906, p. 295.

⁶ Thirty-third Ophthalmological Congress, Heidelberg.

⁷ Klinische Monatsblätter f. Augenheilkunde, July, August, 1906.

⁸ La clinique ophtalmologique, June 10, 1906.

in its effects. He employs a solution containing 20 per cent. of sodium salicylate and 2 per cent. of caffeine in distilled water; 3 c.c. of this were injected daily in some superficial vein of sufficient size—preferably the median cephalic. To test if the point of the needle be fairly within the vein, the piston may be withdrawn sufficiently to get a drop or two of blood before expelling the contents of the syringe. In *gummatous iritis* Darier¹ has used intravenous injections of mercury cyanide, using 3 c.c. of a 1 to 300 solution in artificial serum.

DIONIN. In a case of *acute serous iritis* with glaucomatous symptoms, +T. 2, and vision reduced to counting fingers at 2 meters, Markus² reports rapid and complete cure following the use of dionin. At first a 10 per cent. solution was instilled, and followed by the use of a 5 per cent. solution three times a day. Three days later the eye was free from redness, tension was normal, and vision of $1\frac{1}{2}$ present. Cases in which dionin overcame the action of atropine and produced severe miosis when used for iritis are reported by Suker³ and Wray,⁴ and others have observed a miotic effect from this drug.

The value of *iridectomy* in the treatment of *iridochoroiditis* is urged by Abadie.⁵ He thinks it should be resorted to when, under ordinary methods of treatment, local and constitutional, the condition of the eye ceases to improve, even though the posterior synechia may be insignificant. After the operation the usual methods of treatment seem to again become efficient.

PANOPHTHALMITIS WITH GAS FORMATION. A case due to infection with the *Bacillus perfringens* is reported by Darier.⁶ A young man presented himself with a piece of steel in the vitreous, but without evidences of serious inflammation, twenty hours after the injury. During the following night the eye became extremely painful; and when the patient returned in the morning for magnet extraction the eye was red, chemotic, and of stony hardness, owing to gas formation within the globe. On reopening the wound of entrance a yellow, frothy fluid rushed out. Darier compares it to the opening of a bottle of champagne. The foreign body was extracted and the eyeball enucleated. Bacteriological investigation showed the presence of the *Bacillus perfringens*.

METASTATIC PANOPHTHALMITIS. Some of the principal causes of this condition in the past, as puerperal septicemia, are more rare than formerly. Kipp⁷ has not encountered a case from this cause in the last twenty-two years. He thinks that cases from surgical pyemia must also

¹ La clinique ophtalmologique, November 25, 1906.

² Ophthalmoscope, November, 1906.

³ Ophthalmic Record, April, 1906.

⁴ British Medical Journal, July 21, 1906, p. 140.

⁵ Annales d'oculistique, June, 1906.

⁶ La clinique ophtalmologique, August 10, 1906.

⁷ American Journal of Ophthalmology, November, 1906.

be rare, although he reports 2 such cases. One followed an operation for appendicitis. Both eyes were involved, causing complete blindness eleven days before death. The other case followed a lacerated wound of foot and leg and acute ulcerative endocarditis. Both eyes were affected about two weeks after the endocarditis appeared, and the patient died four days later.

Mayou¹ reports 2 cases occurring in connection with cerebrospinal meningitis and typhoid fever. In each case but one eye was involved. In the former the disease terminated in death, in the latter in recovery.

Reis² reports a case due to injury by a stick of wood; the disease went on to brain abscess and fatal meningitis. Stock³ reports 5 cases following typhus, operation for cancer of the tongue, cataract operation, 1 in a five-week-old infant and 1 in a five-year-old child following one of the exanthems. In the first 2 of his cases the organism was the streptococcus, in the third the pneumococcus. Panophthalmitis following cataract extraction and caused by the pneumobacillus of Friedländer, is reported by Wopfner.⁴

A case of metastatic iritis following furuncle of the face is reported by Schanz.⁵ The *Staphylococcus aureus* was found, both in the abscess and in the anterior chamber.

Sympathetic Disease. SYMPATHETIC OPHTHALMITIS is of general medical interest both on account of the danger of complete blindness from it and because of the significance of the theories regarding its transmission from one eye to the other. The chief of these theories are: (1) the transmission through the ciliary nerves, (2) direct extension along the optic nerve or its sheath, and (3) the metastatic or transmission through the blood.

Römer⁶ has repeated the experiments upon the production of hemolysins and increase of albumin in the aqueous of the one eye by irritation of its fellow, and has been entirely unable to demonstrate any influence thus transmitted from one eye to the other. Römer also finds, contrary to Jesner, that section of the fifth nerve produces no effect on the aqueous of the fellow-eye, although it does increase the albumin and hemolysins in the aqueous of the eye to which the divided nerve is distributed. He therefore thinks the ciliary nerve theory of transmission of sympathetic ophthalmia, being unsupported by any direct evidence, should be given up.

Römer also experimented by the injection of bacteria and trypanosomes into the vitreous of the rabbit, passing the needle through the crystalline

¹ Royal London Ophthalmic Hospital Reports, vol. xvi, pt. iv.

² Postep Okulistyczny, July, 1906.

³ Transactions of the Congress of German Naturalists and Physicians, 1906.

⁴ Klinische Monatsblätter f. Augenheilkunde, May, 1906.

⁵ Festschrift f. v. Kuhnt, 1906. Zeitschrift. f. Augenb., 1906.

⁶ Archiv f. Augenheilkunde, March, August, and September, 1906.

lens to avoid any vascular tissue. In animals thus experimented on the organisms were demonstrated in the blood a few hours after inoculation, in the larger organs of the body, and in the iris of the other eye; while the optic nerves were found free from microorganisms. He concludes, therefore, that the organisms reached the second eye through the blood, and that in the absence of any evidence of transmission by the optic nerve that theory should be given up.

Zur Nedden¹ reports experiments with the blood of patients suffering from sympathetic ophthalmitis. He injected such blood into the vitreous of the rabbit. In 2 cases the injection produced a violent plastic inflammation of the uveal tract. He also showed that the cause of inflammation would not pass through a Berkefeld filter. The filtrate caused no inflammation, excluding a toxin. In 1 case he was able to demonstrate in the rabbit's eye delicate rods resembling pseudodiphtheria bacilli. Cultures of these rods injected into the vitreous of another rabbit produced chronic plastic inflammation similar to that caused by the blood of the patient suffering from sympathetic ophthalmia. Moreover, the injection of such bacilli into the veins or the carotid artery produced a violent uveitis.

In another case zur Nedden was able to check the course of a sympathetic ophthalmitis by injecting 2 c.c. of serum from a patient who had just recovered from sympathetic inflammation. These observations certainly support strongly the view that sympathetic ophthalmitis is transmitted through the blood.

SYMPATHETIC DEGENERATION. Under this title Fergus² reports 12 cases in which, after injury of one eye, its fellow was affected with concentric contraction of the field of vision, generally with impairment of central vision, and sometimes with severe neuralgic pain on the side of the injured eye. Attention has already been called to this condition by Nuel.³ Fergus agrees with Nuel that the degenerative change does not go on to blindness, and that removal of the exciting eye, after such degeneration has occurred, will not remove the symptoms.

IRREGULAR FORMS OF SYMPATHETIC DISEASE. The significance of the inflammatory disease involving one eye after the other is often obscure. Pfalz's case of parenchymatous keratitis, above referred to, is mentioned as possibly sympathetic in character. Suker⁴ reports a case of non-traumatic plastic uveitis followed a few weeks later by a similar disease in the fellow-eye, which he regards as a sympathetic ophthalmia. Until we have a better understanding of the pathology of sympathetic disease, it will be impossible to say which of these cases should be regarded as sympathetic, and which as merely bilateral, in the sense that we have bilateral cataract or pterygium.

¹ Graefe's Archiv f. Ophthalmologie, Band lxii, Heft 2.

² British Medical Journal, December 29, 1906.

³ PROGRESSIVE MEDICINE, June, 1905. ⁴ Ophthalmic Record, December, 1906.

Roure¹ calls attention to sympathetic irritation excited by subluxation of the crystalline lens. He has met with 2 cases, in both of which the irritation was relieved by removal of the luxated lens from the exciting eye.

Diseases of the Retina. PULSATING PHOSPHENES. After rapidly climbing stairs in the dark Bassalini² noticed a pulsating phosphene synchronous with the radial pulse. He ascribes it to pressure of the pulse wave on the retina, much as phosphenes may be produced by pressure with the tip of the finger on the eyeball. Antonelli,³ who has noticed the same phenomenon, agrees with this explanation. He thinks such a phosphene may be a symptom of some value in cardiac disease, arteriosclerosis, and glaucoma.

ARTERIAL SPASM. Visible spasm of the central retinal artery or its branches, causing transient blindness, has been observed by Harbridge⁴ and Lundie.⁵ Transient blindness due to this cause is not at all rare,⁶ and in a few previous cases the eye has been examined ophthalmoscopically during an attack. In Lundie's case, when first seen, the upper main branch of the retinal artery showed an interruption of the column of blood, just beyond the margin of the disk, in a section of the vessel somewhat less than 1 disk diameter. The corresponding portion of the retina was still blind. The whole retina had been affected earlier in the attack. A few minutes later the patient could see quite well and the artery had become normal in appearance.

The case reported by Harbridge is the most important of the kind on record, because the eye was examined repeatedly during such attacks, both by Harbridge and by other ophthalmologists, including Zentmayer and de Schweinitz. There was slight premonitory supra-orbital pain, and "twitching inside the eye." The pupil dilated about two-thirds and the inferior temporal artery gradually lessened in caliber until it completely collapsed. This was rapidly followed by the inferior nasal and superior arteries undergoing the same change. Following quickly upon the arterial change, the veins underwent a similar process, until the entire retinal circulation looked very much like ribbons against the fundus. The head of the nerve became pallid, especially at the periphery. The retina became somewhat hazy. After the fundus remained in this condition about four minutes the inferior arteries began to fill, followed by the others. Then immediately the veins began to fill, the inferior becoming enormously distended. Sight followed immediately after the filling of the vessels, while the pupil was still dilated.

¹ *Annales d'oculistique*, February, 1906.

² *Archives d'ophtalmologie*, February, 1906.

³ *La clinique ophtalmologique*, March 10, 1906.

⁴ *Ophthalmology*, July, 1906.

⁵ *Ophthalmic Review*, May, 1906.

⁶ *PROGRESSIVE MEDICINE*, June, 1903, p. 383.

Harbridge's patient was a man of forty-nine, with a history of syphilis and alcoholism years before, and of continued excessive use of tobacco. There were indications of commencing tabes, but none of arteriosclerosis. The attacks continued for ten days under the use of nitroglycerin, potassium iodide, and mercury, occurring one day as often as every forty minutes. Then they ceased abruptly after a thorough purging with salines, and did not again recur. Lundie's patient was a man of eighty-eight, in good health except for slight bronchitis and with arteries less hard than is usual for his age. There was but one attack, which lasted somewhat over one-half hour.

In some of the previously reported cases repeated attacks of temporary obscuration have been followed by permanent blindness, due to the effects of too prolonged shutting off from the blood supply of the retina; possibly by mere spasm, but probably by thrombosis occurring while the blood current was shut off. Lundie also reports the case of a young lady, for eight years subject to occasional attacks of loss of sight in one eye. After one of these attacks a permanent defect of sight remained—a sector-shaped defect in the visual field. A corresponding area of hazy, swollen, edematous retina was observed at the time. This defect of vision was permanent, and the arterial branch supplying the blind portion of the retina continued extremely small, and could be traced only with difficulty.

Most of the cases heretofore described under the heading of embolism of the retinal artery are due to thrombosis; and probably in many cases slowing of the blood current by arterial spasm is an essential factor. Our knowledge of these retinal lesions is definite because the retina lies open to inspection during life. But it is not to be supposed that such vascular disturbances are confined to the retina; or even that they are most common in a part where their effects are so disastrous. It is reasonable to suppose that they are of pathological importance in other parts of the nervous system, and other parts of the body. Harbridge's patient had suffered from attacks of vertigo and migraine.

RETINAL LESIONS OF ARTERIOSCLEROSIS. These are classed by de Schweinitz¹ as *suggestive* and *pathognomonic*. The former include uneven caliber and tortuosity of the arteries and veins, exaggerated light streak, and unduly light color of the arteries. The pathognomonic signs include a beaded appearance of the arteries, loss of translucency and white stripes in the arterial walls, irregular width of the veins, indentation of the veins where they cross the stiffened arteries, gray opacity of the retina, and hemorrhages. The nerve head has a dull-red appearance, often described as congestion, but differing from the congestion of eyestrain, exposure to intense light or heat, etc., as the "unhealthy flush of a cheek differs from the brighter color of a normal blush." So far as de Schweinitz is aware these signs are produced by no condition

¹Ophthalmic Record, August, 1906.

other than the persistent high arterial tension of arteriosclerosis. The eyeground examination is, therefore, of paramount importance in the early recognition of vascular disease. It may aid to interpret symptoms dependent upon sclerotic changes in the smaller vessels of important organs, before there is any decided alteration in the general circulation, and at a time when most can be hoped from treatment.

Coats¹ points out that the angiosclerotic processes are almost always exceedingly irregular in their distribution. Such disease of the retinal vessels is, therefore, not positive proof of disease in other vascular areas. This detracts "from the value of ophthalmoscopic evidence of general vascular disease. Yet it remains the best indication of the state of the vessels generally which we possess."

The correspondences between "the senile eye" and the eye afflicted by arteriosclerosis are traced by Vennemann.² Both show the effects of diminished blood supply, although in the former these effects are general throughout the eye, while in the latter the ischemia is more likely to be localized.

Rohmer³ traces the same parallel between senile and angiosclerotic eyes, pointing out that in the senile eye with diminished acuteness of vision there is also diminished perception of color. Rohmer also places among the symptoms of ocular arteriosclerosis the temporary impairments of vision similar to those above referred to.

All the above-mentioned writers also refer to obstruction of the circulation by endarteritis and thrombosis, and also to retinal hemorrhages, and Rohmer takes up the connection of the sclerotic process with glaucoma. (See section on Glaucoma). The connection of arteriosclerosis with retinal degeneration, particularly fatty degeneration of the glia cells, is pointed out by Krückmann.⁴ Striking changes in the macula are connected with arteriosclerosis in a case reported by J. Galezowski and Benedetti.⁵

Diseases of the Optic Nerve. OPTIC NEURITIS WITH BRAIN TUMOR. Recent studies, both clinical and experimental, strongly support the view that optic neuritis developing in connection with brain tumor, is at least largely due to increased intracranial pressure. Levinsohn⁶ accepts as the primary factors the increased intra-ocular pressure and the inflammatory alterations of the cerebrospinal fluid. Gunn⁷ points out that myopic eyes very rarely show optic neuritis from this cause, and that in myopic eyes the dural sheath of the nerve is not so closely united to the

¹ Ophthalmoscope, November, 1906.

² Annales d'oculistique, June, 1906.

³ Archives d'ophtalmologie, May, 1906, p. 318.

⁴ Transactions of the Thirty-third German Ophthalmological Congress, Heidelberg.

⁵ Recueil d'ophtalmologie, July, 1906, p. 430.

⁶ Graefe's Archiv f. Ophthalmologie, Band lxxv, Heft 3.

⁷ Transactions American Academy of Ophthalmology and Otolaryngology, 1906.

nerve trunk, permitting the easier escape of fluid from the intravaginal space by filtration.

The beneficial *effects of trephining* have been previously mentioned in these articles.¹ It must now be regarded as settled that optic neuritis, or choked disk, is a sufficient indication for opening the cranium and the dura, even though nothing more be attempted. De Schweinitz² says: "Such palliative trephining should be performed early, especially in the choked disk of cerebellar tumor, which is almost sure to produce blindness. Spiller³ says: "Palliative operations should be performed early in every case in which symptoms of brain tumor are pronounced, and before optic neuritis has advanced far."

Krudener⁴ supports such a view by the endorsements of nearly a score of the foremost surgeons and neurologists who have written upon the subject. Horsley⁵ says: "It is now possible to dogmatize on this question, and to say that in no case of optic neuritis (not, of course, of toxemic or anemic origin) should the process be allowed to continue after it has once been diagnosticated, and that if blindness results therefrom the responsibility is very heavy on anyone who fails to advise such a simple proceeding as opening the dura mater." To enforce the gravity of such responsibility he cites a case of a woman recovering from the cerebral lesions, but left blind for life, because the optic neuritis was allowed to run its course, without operation, to optic atrophy.

The Optic Tracts. DISEASES OF THE PITUITARY BODY. The importance of lesions involving the optic chiasm has been previously discussed.⁶ J. Galezowski⁷ reports 2 cases in which bitemporal hemianopsia was the earliest and most striking symptom of such disease. In Hansell's⁸ case impairment of vision seems to have taken the form of concentric limitation of the fields, loss of color vision, and central scotoma. It ended in permanent blindness, after three attacks of complete blindness had been followed by return of light perception. The disks were atrophic. The autopsy showed a tumor, 4 cm. by 1 cm., compressing the optic tracts. The general symptoms included sleepiness and attacks of temper in which the patient became cyanotic. There was no headache or vomiting.

Harms⁹ has encountered a case of *giantism*, beginning at fourteen years of age, in which there was bitemporal hemianopsia, and in which the Röntgen rays showed excavation of the sella turcica. A case of

¹ PROGRESSIVE MEDICINE, June, 1903, March 1907.

² New York Medical Journal, February 18, 1906.

³ Journal American Medical Association, September 8, 1906.

⁴ Graefe's Archiv f. Ophthalmologie, Band lxx, Heft 1.

⁵ British Medical Journal, August 25, 1906.

⁶ PROGRESSIVE MEDICINE, June, 1905.

⁷ Annales d'Oculistique, November, 1906, p. 396.

⁸ Transactions of the American Ophthalmological Society, vol. xi, pt. i.

⁹ Transactions of the Congress of German Naturalists and Physicians, 1906.

cystic degeneration of the pituitary body with pressure of the optic chiasm is reported by Peck.¹ The first symptom noted was impairment of vision, which proved to be bitemporal hemianopsia. There was an inclination to sleep continually, and great thirst, with passage of eight and later twelve quarts of urine daily. There were headache, failure of memory, and disturbances of circulation. The bitemporal hemianopsia was followed by encroachment on the nasal fields of vision, particularly of the right eye, and some atrophy of the right optic nerve. Toward the close there were delirium and stupor, and the face became greatly swollen. The autopsy showed cystic degeneration of the pituitary body, the tumor being as large as an English walnut or small hen's egg. The sella turcica was greatly increased in size; the bones of the face increased an inch or more the last few weeks of life.

In a fatal case reported by Würdemann and Becker,² the first symptom was exophthalmos, which became excessive so that both eyes were lost through sloughing of the cornea. Death occurred from meningitis. This patient was sixty-one years old, the disease having lasted only eight months. There were no symptoms of acromegaly, but some evidence of Graves' disease. The tumor of the pituitary body, an endothelioma, measured 25 by 12 by 26 mm.

A very remarkable case is reported by Wood.³ The patient had suffered from headaches and impaired eyesight for one year, and had to give up work on account of poor vision and loss of memory. He had some vomiting unrelated to taking of food. He had a dull, absent manner. In trying to think of the right word he would forget what he was speaking about. There was loss of the visual temporal field in both eyes, and impaired nasal field in the right. A radiograph showed ill-defined, increased opacity, in the region of the sella turcica. He was watched fifty-two days in the hospital, growing mentally worse and weaker. He grew noisy and filthy in his habits, and was removed from the hospital with a very bad prognosis. He remained stuporous and grew very weak and unable to walk, and contracted a severe cough with bronchial expectoration. But two months after leaving the hospital he suddenly sat up in bed and said, "Hello, where am I?" From that time he was entirely rational, but he had no recollection of persons or events after entering the hospital four months previously. He was immediately able to use his limbs and gained strength rapidly. He remained blind in the right eye, and with only a slight enlargement of the visual field in the left. But otherwise he was quite well during the year that had elapsed.

Wood thinks that it is hardly possible to account for the symptoms and rapid recovery, otherwise than by cystic tumor connected with the

¹ Ophthalmology, April, 1906.

² Ibid.

³ Transactions of the Ophthalmological Society of United Kingdom, vol. xxvi.

pituitary body, which caused absorption of the thin bone, and by rupture suddenly relieved the brain of pressure symptoms. This view was concurred in by Russel and Beevor. Cysts of the pituitary body are not rare, and the favorable termination of Wood's case suggests the possibility of relief by surgical interference.

Toxic Amblyopias. METHYL ALCOHOL. Blindness from wood alcohol ranks in practical importance alongside of the longer-known alcohol-tobacco amblyopia; if, indeed, it be not the most important of all the toxic amblyopias. The latter causes central scotoma, from which, under appropriate treatment, many patients recover. But wood-alcohol amaurosis is, in a large proportion of cases, complete, and after the first few days commonly improves but little under treatment.

The number of recorded cases of loss of sight without drinking of the wood alcohol has been increased by several reports within the last year. Phillips¹ saw a man who worked in the store-room of a paint factory. In drawing wood alcohol he spilled a quart or so of it on the floor and on one of his feet, and he continued to work in this room for some hours. He became dizzy, had disturbance of vision, awoke next morning totally blind, and ultimately suffered from optic atrophy, with complete blindness. Gifford² had a patient who worked three or four hours in a small room staining with a mixture in wood alcohol. After total blindness for a week he regained some vision. Ziegler³ had a case produced by inhalation of the fumes for an hour daily.

It is characteristic of methyl-alcohol amblyopia that after a period, usually some days, of complete blindness, a good deal of sight is regained; but later, usually within three weeks, vision again diminishes until ultimately mere light perception alone remains. De Schweinitz and Shumway⁴ report a case in which, after forty-eight hours of complete blindness, there was return of vision which lasted nearly four months, when there was again gradual failure and the optic disk became atrophic. The patient after a year still retained very useful vision. In Gifford's case, above mentioned, the period of improvement lasted two or three weeks and was followed by a change for the worse, which continued for six months, when he was practically blind. After this, however, there was gradual improvement of sight until the patient was able to count fingers at six inches and a foot, and he could find his way about quite readily. In this case it is notable that during the first period of complete blindness the patellar reflex was entirely absent; but subsequently, during the later period of improvement, it became again normal.

FORMALDEHYDE AMBLYOPIA. Gifford also reports a case of amblyopia occurring in a woman who used to heat her room by a methyl-alcohol

¹ Ophthalmic Record, November, 1906.

² Ophthalmic Record, June, 1906.

³ Transactions of the Ophthalmic Section of the College of Physicians of Philadelphia, February 20, 1906.

⁴ Loc. cit.

lamp with a large, flat wick. He ascribes the amblyopia in this case to a supposed toxic influence of the formaldehyde formed by combustion of the wood alcohol. He points out 2 similar cases, also due to burning wood alcohol, in Wood and Buller's series, and reports 1 in which the amblyopia followed exposure to formaldehyde used as a disinfectant. In all these cases improvement followed removal of the cause.

QUININE AMBLYOPIA. In quinine blindness produced experimentally in dogs, de Schweinitz demonstrated, years ago, the formation of a thrombus in the central retinal vein. But the reported cases of this disease in man have mentioned, with regard to the retinal vessels, only their extreme narrowing. F. J. Parker¹ now reports a case in which there was a thrombus in the inferior branch of the retinal vein of the right eye and another in the superior branch of the retinal vein of the left eye, with evidences of endarteritis of the larger branches and obliteration of the smaller arteries. Seeligsohn² reports a case in which were seen early diffuse clouding of the retina, with a cherry-red spot in the macula, narrowing of the bloodvessels, and slight clouding of the disk margin. Later there were clear evidences of endo- and paravascularitis. The blood column was narrowed or obliterated, and white lines bordered or replaced the vessels. These vascular changes in quinine poisoning are of interest in connection with the cases of permanent blindness from interruption of the retinal blood supply, referred to under Retinal Disease.

Glaucoma. PATHOGENESIS AND PATHOLOGY. In general interest the theoretical explanations of glaucoma are quite equal to those that account for sympathetic ophthalmia, and the observations put forward to support these suggestions throw important light on general problems of nutrition. The view of Uribe-Troncoso,³ that the presence of albumin in the aqueous humor was the starting point of the glaucomatous process, and his experiments in support of this idea have been previously noted.

Leber objected to this, that albumin in the aqueous occurred in inflammations of the eye with decreased intra-ocular tension. Troncoso⁴ replies that in such inflammations (serous uveitis) there is a temporary increase of tension in the eyeball, followed by diminished tension when the exudates undergo organization and the secretion of albumin is diminished. Leber and Pilzcker,⁵ experimenting with a 1 per cent. solution of sodium chloride, find that after the filtration flow has been once established it is comparatively regular—about 20 c.mm. per minute in the pig's eye, under pressure of 25 mm. of mercury. They also find that under increased pressure the eye is capable of containing a notably

¹ Archives of Ophthalmology, September, 1906, p. 420.

² Centralblatt f. praktische Augenheilkunde, June, 1906, p. 182.

³ PROGRESSIVE MEDICINE, June, 1902.

⁴ Klinische Monatsblätter f. Augenheilkunde, May, 1906.

⁵ Graefe's Archiv f. Ophthalmologie, Band lxiv, Heft 4.

larger amount of fluid, partly through the elasticity of its coats, and partly by change of form, approaching more nearly the spherical. Hence increased rigidity of the sclera with age may be an important factor in producing glaucoma. They find, however, that injection of fluid into the vitreous produced only an insignificant increase of the vitreous pressure over the pressure in the anterior chamber. So that pushing forward of the root of the iris, closing the filtration angle, can scarcely occur from mere mechanical increase in the vitreous.

Coats,¹ while admitting that a fully satisfactory hypothesis has not yet been advanced to account for glaucoma following thrombosis of the central retinal vein, considers "the most probable explanation to be the more albuminous nature of the vitreous, and, therefore, of the aqueous, due to venous obstruction." Henderson and Starling² find that "increased proteid contents" of the intra-ocular fluid slows the rate of absorption.

The occurrence of increased tension of the eyeball, while the anterior chamber was of good depth and its angle open, has been a difficulty in the way of current explanations of glaucoma. Raehlmann³ offers a possible explanation, which agrees well with the view that glaucoma is produced by changes in the aqueous humor. He finds the normal aqueous free from albumin, but after emptying the anterior chamber it is refilled by an albuminous fluid, in which the ultra-microscope shows the albumin as small, uniform particles, which in the normal aqueous remain equidistant. The addition of a ferment or precipitin causes them to agglutinate and collect in masses. Such masses accumulate on the posterior surface of the cornea in serous uveitis ("descemetitis"). Raehlmann believes that in glaucoma their accumulation in the irregular spaces of Fontana may cause the blocking of the outflow channels of the anterior chamber. After injury of the crystalline lens particles of globulin are found in the aqueous, which, deposited in a similar manner, may help to cause the glaucoma that sometimes follows lens injuries.

Of interest in connection with Raehlmann's observations are the experiments of Erdmann,⁴ who produced glaucoma in rabbits by electrolysis, using as the positive electrode a steel needle thrust into the aqueous. Electrolysis of the aqueous humor outside the eye gives a green precipitate of particles of iron. This precipitate injected into the anterior chamber of the rabbit produced inflammatory reaction, and in 75 per cent. of the cases increase of tension. Erdmann, supposes that whether formed in the eye or injected into it, the precipitate, finding its way into the spaces of Fontana, by accumulating there, and by the inflammation it sets up, blocks the drainage apparatus of the anterior chamber.

¹ Royal London Ophthalmic Hospital Reports, vol. xvi, pt. iv.

² Archives of Ophthalmology, January, 1906, p. 62.

³ Die Ophthal. Klinik, July 20, 1906.

⁴ Ibid., August 28, 1906.

TREATMENT OF GLAUCOMA. Koster's¹ experience shows 62 per cent. of inflammatory cases benefited by iridectomy, while in simple glaucoma this operation failed to check the disease in 73 per cent. of the cases. In the latter form he believes sclerotomy repeated several times, if necessary, will give better results. In buphthalmos, also, sclerotomy is to be preferred. Koster does not advise myotics except in buphthalmos, believing that they fail to hold a tendency to increased tension permanently in check, but permit the time to go by when operation would be effective.

Schleich,² in simple glaucoma, found 16 per cent. of his cases checked by iridectomy, while with myotics 39 per cent. were checked. Posey³ has written a paper "to extol the action of myotics in the treatment of simple glaucoma." He recognizes two distinct types of glaucoma: the congestive, in which early iridectomy is indicated, and the non-congestive or simple type, better treated by myotics. In the treatment with myotics he aims to keep the pupil fully and constantly contracted. In the discussion of his paper Weeks, Bull, de Schweinitz, Wilder, and Callan all expressed agreement with his estimate of the value of the myotic treatment. In this connection, however, it must be borne in mind that for cases of glaucoma with exacerbations (the congestive form) the superiority of iridectomy is admitted by all.

Diseases of the Crystalline Lens. TOXIC CAUSES OF CATARACT. Mechanical explanations of cataract, based on the effects of trauma, the splitting apart of lens fibers, and the increase in or abstraction of fluid from the lens substance, have heretofore attracted chief support. Leber in an elaborate paper, abstracted by Davis,⁴ turns attention to the chemical and metabolic causes of cataract. He shows that the lens tissue has a vital selective action by which certain substances are rapidly taken into it, while others are rejected. Thus fluorescein quickly penetrates the capsule, but very slowly gains entrance to the lens substance. Chloroform, phenol, and acetone are quickly taken up. Leber points out that the lens and the central nervous system, developing from the epiblast, are similar in chemical composition, in that they are rich in cholesterin and lecithin. Leber believes that intermediate products of metabolism soluble in lipoids may account for the occurrence of cataract. The increase in cholesterin and lecithin in the lenses of old people may render them more vulnerable to some of the products of defective metabolism, such as butyric and acetic acids and acetone.

Romer⁵ believes that in a study of the toxicology of the lens we will

¹ Graefe's Archiv f. Ophthalmologie, Band lxiv, Heft 2.

² Die Ophthal. Klinik, October 5, 1906.

³ Transactions of the American Medical Association, 1906. Section on Ophthalmology.

⁴ Ophthalmic Record, October, 1906.

⁵ Transactions of the Thirty-third German Ophthalmological Congress, Heidelberg.

discover causes of cataract, and that it will be possible to secure immunity from cataract by the use of appropriate serums. He finds, however, that the production of acetone, and in general of substances soluble in lipoids, is not greater in persons suffering from senile cataract than in those with clear lenses.

HEREDITARY CATARACT. Since the publication of Nettleship's paper upon this subject last year,¹ C. A. Wood² has reported three families thus affected. In one of these families, suffering from presenile cataract and traced through three generations, five out of six extraction operations were followed by total blindness from glaucoma; and three cataractous eyes, not operated on, also became glaucomatous and totally blind. In a second family with juvenile cataract, 12 and perhaps 14 out of 44 to 48 individuals in three generations were affected. In a third family, among 31 individuals in four generations, 12 had cataract, most of them presenile, and some certainly lamellar. Hosch³ reports two families suffering from lamellar cataract; one was traced through three generations; in the other the mother and two children were similarly affected.

Nettleship⁴ in a supplementary paper includes four other families in which lamellar cataract was traced through three to five generations, and brings together a number of other new or previously reported cases. He has now collected 123 family histories illustrating the heredity of these lens defects. But the most striking instance is a family studied by Nettleship and Ogilvie.⁵ In this family the history has been traced through seven generations, including 300 or more individuals. More than 150 members of the last four generations have been subjected to careful ophthalmoscopic examination; 20 cases of cataract were found. In all cases the opacity had the form of a sharply defined, circular disk, deep in the lens between the nucleus and posterior pole. It was ordinarily about 4 mm. in diameter, and in every case accurately symmetrical in the two eyes. Mostly the opacity was uniformly distributed throughout this disk, and dense enough to prevent any view of the fundus through it. Visual acuity was not much lowered, being sometimes normal and seldom less than $\frac{6}{12}$. But generally the patient would shade the eyes with his hand to get the best vision. In a few cases other slight opacities of the lens were discovered. Nettleship points out that in every instance the descent of the defect was direct, from cataractous parent to cataractous child. Any line becoming free from the cataract remained free from it.

The Lids. A NEW LID SYMPTOM OF EXOPHTHALMIC GOITRE. To the retraction of the lids (Dalrymple's sign), infrequent incomplete

¹ PROGRESSIVE MEDICINE, June, 1906.

² Ophthalmic Record, April, 1906.

³ Archiv f. Augenheilkunde, February, 1906.

⁴ Royal London Ophthalmic Hospital Reports, vol. xvi, pt. iv.

⁵ Transactions of the Ophthalmological Society of United Kingdom, vol. xxvi.

winking (Stelwag's sign), and failure of the upper lid to accompany downward movements of the globe (Graefe's sign), Gifford¹ adds great difficulty in everting the upper lid, which, according to all precedent, should be named Gifford's sign. He first noted this in a case of one-sided exophthalmos with Graves' disease. The upper lid could only be turned with great difficulty, and such strain on the tarsal conjunctiva that it was entirely blanched in the centre by the pressure. The upper retrotarsal fold seemed to be pulled back so firmly as to make it almost impossible to evert the lid. This sign Gifford has observed in 3 cases, all of which were examined to determine its presence. C.S. Bull confirms the observation, by 3 cases of his own, and Strader² reports a case confirming it. This difficulty in everting the lid Gifford ascribes to spasm of the non-striated elevator of the lid—the muscle of Müller. It is an early symptom, disappearing later in the course of the disease.

Gifford mentions the excessive lacrymation sometimes occurring with Graves' diseases as another symptom due to the influence of the sympathetic nerve. He also calls attention to a swelling of the tissue between the eyebrow and eyelid as an early symptom of Graves' disease. It is spoken of inaccurately as a "puffiness" of the lids; but it is rather a solid-looking thickening of the tissues immediately beneath the eyebrow, sometimes with slight redness of the skin. In Strader's case this symptom was well marked. The patient also suffered with excessive lacrymation, which troubled her only at night. Gifford thinks this occurring only at night disposes of the suggestion that such lacrymation may be due to excessive exposure of the eyeball.

Diseases of the Orbit. RECURRING HEMORRHAGE. A case in which operation for a supposed dermoid behind the lower lid revealed an encysted mass of broken-down blood is reported by Wagner.³ The wound healed by first intention, but five days later exophthalmos and ecchymosis showed the occurrence of a new hemorrhage into the orbit. The swelling continued to increase; the lid was reopened and a tablespoonful of thick, uncoagulated blood was removed. Eight days later, and again five days after that, hemorrhage recurred. The patient was a weak, anemic boy five years old. It was now concluded that the cause of the hemorrhage was deficient coagulability of the blood. To remedy this, eleven syringefuls (10 c.c. each) of a 10 per cent. sterilized gelatin solution were injected. There was no recurrence of the hemorrhage until three months later. Then the injections of gelatin were again repeated, and the hemorrhage did not again recur.

Brunetière⁴ reports 2 cases of such hemorrhage occurring in women in good general health. In the first, aged twenty-four, pain and swelling

¹ Ophthalmic Record, June, 1906.

² Ibid., October, 1906.

³ Centralblatt f. praktische Augenheilkunde, February, 1906.

⁴ Annales d'Oculistique, June, 1906.

of the eye were first noticed three days after weaning her second child. The second patient, aged twenty, had suffered from irregular and painful menstruation, and for six months had only recurring, abdominal pain and intolerable headache, without menstrual discharge. In one of these attacks exophthalmos appeared, with pain in the orbit.

These cases illustrate the uselessness of operative interference. Brunière's operations seemed demanded by the destruction of vision in the affected eye. The first patient was operated on four times, the second twice. At the last operation, in each case permanent drainage was tried. But the final result in the first case was a blind eye with exophthalmos; and in the second the affected eye, being blind, was enucleated for pain.

ORBITAL INFLAMMATION. Suppuration in the orbit, on the one hand, endangers sight, and, on the other, threatens the life of the patient. In Hermann's 69 cases of orbital abscess, 13 suffered great impairment of vision, 7 complete amaurosis, and 4 ended in the death of the patient.

Paunz¹ classifies the causes of orbital abscess as:

1. Direct wounds of the orbit.
2. Disease of the eyeball (panophthalmitis).
3. Extension of an inflammation from neighboring parts: (a) From the skin (eyrsipelas). (b) From the walls of the orbit (periostitis). (c) From neighboring sinuses (frontal, maxillary, and ethmoidal).
4. As the result of general infections.

Group 3 includes the causes of greatest practical importance, especially the extension from neighboring cavities. But all of these causes should be considered in making the diagnosis of any particular case. Paunz reports 3 cases, 1 following furuncle, the others from suppuration of the nasal sinuses, 1 of the latter terminating in death by purulent meningitis.

Lafon² records a case in which orbital cellulitis followed acute suppuration of the frontal sinus, the infecting organisms appearing to be a staphylococcus and a pseudodiphtheria bacillus. In a case reported by Curn³ the orbital cellulitis seemed to be metastatic, following pyemia, due to streptococcus infection which it was supposed might have occurred through the vesicles caused by the application of "mesotan." The autopsy showed multiple abscesses of the liver and kidney.

Disorders of the Ocular Muscles. **OPERATION FOR PARALYTIC SQUINT.** It has generally been taught that comitant squint might be operated on, but paralytic squint should not. With the restriction of the operative treatment of the former, there has come a disposition more frequently to resort to operation for the latter. It is generally recognized that in certain cases of partial paralysis, or incomplete re-

¹ Zeitschrift f. Augenheilkunde, July, 1906, p. 66.

² La clinique ophtalmologique, March 10, 1906.

³ Archives of Ophthalmology, September, 1906, p. 467.

covery from paralysis, an operation may bring the region of comfortable binocular vision to the lower central part of the field of fixation, where the eyes are most used, and may thus be of great benefit to the patient.

Callan¹ would extend the field for operation in paralytic squint. He would resort to it at a comparatively early period. He thinks that at the end of a month's treatment, when there is little or no improvement, an operation ought to be done for the relief of diplopia; that there is nothing to gain by waiting, and the patient's comfort should be considered; that in most instances operation is too long delayed. He reports a case in which, however, the operation was not done until the end of eight weeks. Six weeks later perfect motility had been gained.

Eye-strain. It would be a grave error to estimate the practical importance of a subject by the space it occupies in the medical journals of the passing year. The error would be still greater if such an estimate were based upon the space given to it in a review like this, in which only the more important *new* observations can be noticed. The last year's literature relating to eye-strain must be classed as belonging chiefly to that majority of current medical literature which serves the worthy purpose of educating the profession; although it does not place on record observations of absolutely new scientific facts.

Gould² brings forward additional material in cases coming under his actual observation to support his contentions regarding eye-strain. But these cases resemble, in their scientific aspects, cases previously reported, and which could in many respects be duplicated, far too frequently, from the experience of any ophthalmologist. H. A. Wilson³ supports Gould's claim that head-tilting and spinal curvature arise from astigmatism with oblique axes. Semple⁴ reports 1 case of apparently true epilepsy and 1 of epileptoid seizures, apparently cured by the wearing of correcting lenses for astigmatism.

Jessop⁵ thinks that constant headache, in otherwise healthy children under fourteen years of age, may always be regarded as due to eye-strain. He finds that the headache from eye-strain seems to occur somewhat earlier in girls than in boys. With regard to the correction of ametropia he says: "No cases demand more attention as to small matters of detail."

Hinshelwood⁶ emphasizes the point that in a very large proportion of patients suffering from eye-strain there is no defect of vision, no symptom directly referable to the eyes, and the patients themselves have never suspected the cause of their sufferings.

¹ New York Eye and Ear Infirmary Report, 1906.

² Biographic Clinics, vols. iv and v.

³ New York Medical Journal, July 28, 1906.

⁴ American Journal of Ophthalmology, December, 1906.

⁵ Practitioner, July, 1906.

⁶ Lancet, July 14, 1906.

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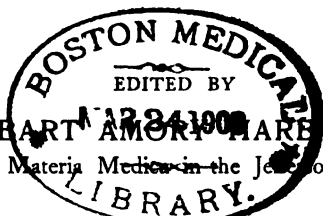


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Professor of Therapeutics and Materia Medica in the Jefferson Medical College, Philadelphia

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